The REACH Initiative

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Executive Summary

This report presents a national strategy for Jordan to develop a vibrant, export-oriented Information Technology Services sector. The strategy will bolster the country's nascent IT sector and maximize its ability to compete in local, regional, and global markets. It takes into consideration Jordan's strengths and weaknesses vis-à-vis other relevant competitors. Most importantly, it outlines a clear **action plan**, specifying actions to be implemented—by the private sector, the Government, and by other stakeholders—to ensure a favorable place for Jordan in the knowledge-based economy of the future.

Pursuing accelerated software and IT services development will result in significant benefits for Jordan. Its resources and people are particularly well suited for an IT-based growth trajectory (see boxes below).

Some Benefits of Accelerated IT Sector Growth

Economic Benefits
- 30,000 IT-related jobs by 2004
- US $550 million/year in exports by 2004
- Substantial foreign direct investment
- Increased government revenues

Social Benefits
- Empowered population
- Improved public services
- Better education

Strategic Benefits
- Greater efficiency of Government
- Creation of a Knowledge-base economy
- Enhanced economic competitiveness
- Less dependent on traditional markets

Why Software and IT Services Makes Sense for Jordan

Low Start-Up Capital Requirements
- Less barriers to entry
- Easy for smaller players to get started

Jordan has Comparative Advantages In the Regional Market
- Higher literacy & productivity
- Reputation of being trusted suppliers

Human Resource Characteristics
- Proportionately more Jordanian students enrolled in IT-related fields
- Natural IT inclination of Jordanians

Not Affected by Transportation
- Products & services delivered electronically

Opportunities for Jordanian Firms

The world market for software and computing services topped US$400 billion in 1998, and will likely reach upwards of US$620 billion or more by 2002, due to annual growth rates exceeding 10%. Growth is so robust that primary markets such as the U.S. and Europe are suffering acute labor shortages. IT firms from these regions are increasingly solving this problem by outsourcing high value-added work overseas, generating investment and employment in IT firms of emerging economies. **Jordan is well positioned to take advantage of this trend**—particularly in certain software development and IT service niches. Relatively smaller regional IT markets are currently growing at over 18%, also creating important opportunities for Jordanian IT firms (see table).

Summary of Jordan's IT Market Opportunities

Market Opportunity	Activity	Jordan's Potential
Global off-shore outsourcing for software development	Needs analysis/functional specification	Low in short-term
	Design	Low in short-term
	Coding	High in short-term
	Testing	High in short-term
	Implementation/maintenance	Medium in short-term
	Customization (including Arabization)	Medium in short-term
Regional and Global Provision of other IT Services	Consultancy services (including training, body-shopping, etc.)	High within region Low outside region
	Low-end remote processing/ teleworking	High regionally Low globally
	High-end remote processing and knowledge management	Medium, both regionally & globally
	Voice center operations (e.g., customer service & technical assistance centers (TACs)	Low to Medium regionally; Low in global market

Profile of Local Market

The total market for IT hardware and software sales in Jordan is estimated to be approximately US$60 million, including the Government and Commercial sectors. According to various sources of data, about 27% of this figure correspond to sales of software and IT services, while 73% corresponds to computers and other hardware. The IT market is estimated to be growing between 15 and 30% per year. But exports, which currently exceed US$7 million, are growing at over 100% annually. This reflects the fact that Jordanian IT firms are building capacity, and are competing locally, regionally, and in several cases globally.

Software Market Data: Jordan, Saudi Arabia, Egypt and Israel

Jordan
$16.2 million in local s/w sales, 15-30% growth
$7-12 million s/w & IT exports, > 100% growth
$60 million overall IT market (1999)

Saudi Arabia
$420 million local software sales, 10% growth
$1.2 billion overall IT market (1998)

Egypt
$50 million local software sales, 35% growth
$250 million overall IT market (1998)

Israel
$800 million local s/w sales, 10% growth
$1,500 million s/w exports, 50% growth (1998)

Source: Country commercial guides & Internet sources; Israel Assoc. of S/W Houses & MoI&T; Jordan data estimates.

Competitiveness of Jordan's IT Industry

Jordan's software and IT services sector has a number of important strengths and weaknesses, detailed in Chapter 3 of this report and summarized in the table below. Our overall conclusion is that the key advantage of Jordan lies in its human capital resources. All the obstacles identified by the analysis could be gradually addressed to exploit this significant competitive advantage. What is required is simply to embrace a focused strategy and action plan with full commitment from the IT industry as well as the corresponding Government entities.

Strategy & Action Plan

The strategy and action plan center around a carefully developed vision for Jordan's IT sector. The Vision for the Software and IT Services industry is to become a regional leader and internationally recognized exporter of IT products and services. Two aspects of the Vision are at its core:

1) Private sector leadership; and **2) Partnership with the Government**

Summary of Jordan's IT Strengths and Weaknesses

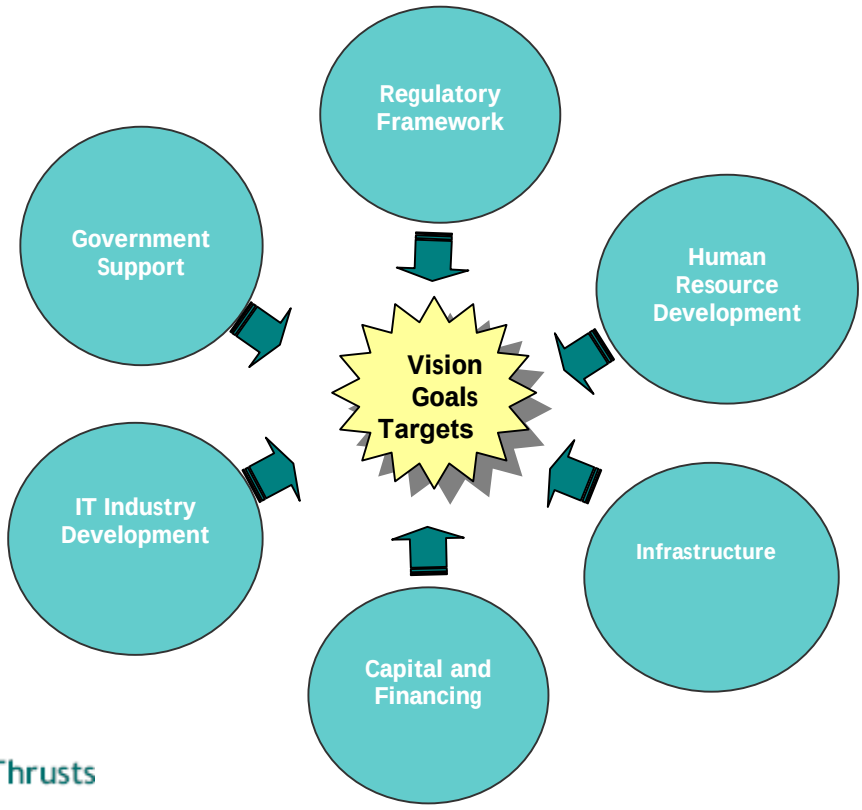
	Strengths	Weaknesses
IT Firms' Capabilities	-Availability of good "raw talent" -Use of latest software development tools -Good relations with offshore markets -High quality reputation -Time zone advantages relative to US, EU	-Small size, fragmented, small scale -Limited capitalization -Limited foreign collaborations -Lack of access to critical skills -Lack of use of leading operations tools
Regulatory Framework	-Competitive Copyright law in place -IPC incentives for software "industry" -Customs procedures being streamlined -Limited enforcement of censorship controls	-Lack of IPR enforcement -Uncompetitive labor regulations -Import/export procedures still cumbersome -Censorship provisions in laws -IT services do not benefit from IPC incentives -Foreign investment limits in services -Restrictive access to high-speed telecoms -Limited support from Government -Exclusion of IT products from bilateral and multilateral trade agreements
Assistance and Support Programs	-Moderate export promotion program in place -Investment promotion program in place	-Higher Council for S&T and RSS/NIC not focused on commercial activity -Weak IT sector association -JEDCO lacks resources, not connected to IT industry -IPC does not target IT sector -Lack of incubators and assistance programs -Lack of venture capital & finance mechanisms -Lack of quality certification
Human Resources	-Good quality IT raw talent -Low wage IT labor -Relatively large supply of IT labor	-Computer science education unconnected to industry needs -Limited interaction between education sector and industry -Limits on commercialization of university activities -Absence of specialized IT institutes -Limited computer resources and awareness at all levels of educational -Brain drain of IT professionals -Poor work ethic/company loyalty
Infrastructure and Physical Facilities	-Adequate access to low-speed data communication services for present needs -Adequate office facilities and business support services for established IT firms	-Very high cost of high-speed data telecommunication services -Limited capacity and poor quality of lines for internet access -Physical facilities not adequate to meet expansion of IT services industry

The overall goals include developing an **internationally competitive IT industry** in Jordan—one that attracts both **foreign and local investment**, generates **high-value jobs**, and produces substantial levels of **exports** in the near to medium term. The strategy's implementation will facilitate **modernization** of both the Government and the private sector. Finally, the long-term goal is to **position Jordan favorably** within the knowledge-based economy of the future.

Based upon realistic assumptions of the stimulation and growth made possible by implementing this strategy, we project the following economic impacts and will use these as specific targets over the next 5 years:

- **30,000 IT-related jobs by 2004**.
- **US$550 million in annual exports by 2004**
- **US$150 million in cumulative Foreign Direct Investment by 2004.**

Jordan's Software and IT Services Development Strategy



Strategic Thrusts

Achieving these goals and economic targets will require the sustained implementation of a range of actions in a number of inter-related areas. Our plan consists of focused and time-bound actions within **six strategic thrusts**:

- **IT Industry Development**
- **Policy and Regulatory Strengthening**
- **Human Resource Development**
- **Government Support**
- **Capital and Financing**
- **Infrastructure Improvement**

For success, it will be necessary to implement concrete actions in each of these strategic thrust areas. This will allow the IT services industry to become one of Jordan's leading export winners—rivaling traditional mining and tourism exports. The table below summarizes the actions to be taken. Detailed descriptions, along with timelines and indications of responsible parties, are provided in Chapter 4 of the present report.

Summary/Conclusion

The Information Technology Revolution is well under way. At no other time in history has it been so important for countries such as Jordan to position themselves and take action in the face of dramatic changes caused by technology. Countries that fail to do so will be condemned to prolonged if not permanent disadvantages. Catching up becomes more difficult with every day that passes. On the other hand, those with natural advantages that succeed in positioning themselves now and creating a conducive environment will enjoy enormous benefits.

Summary of Proposed Action Plan

Actions	IT Industry Role	GoJ Role	Role of Other Stakeholders
IT Industry Development			
1. Establish new IT Industry Association	X		X
2. Promote joint collaborations among IT companies	X		
3. Improve capabilities of Jordanian IT companies	X		X
4. Develop Employee Stock Ownership Plans for IT firms	X	X	X
5. Develop software quality certification programs	X		X
Regulatory Framework Strengthening			
1. Reduce indirect tax burden on all IT related products		X[1]	
2. Streamline Customs procedures		X[1]	
3. Enforce intellectual property rights, especially Copyrights		X[2] [1] X[3]	
4. Amend restrictive provisions of Labor law		X[4]	
5. Continue policy of no censorship of IT products		X[1]	
6. Adopt more competitive taxation policies		X[1]	X
7. Enhance access to IPC incentives		X	X
8. Remove constraints to ESOPs		X[5]	
9. Sign the Information Technology Agreement and IT customs valuation accord of WTO	X	X	X
10. Develop Electronic Commerce legislation			
Human Resource Development			
1. Initiate program by IT industry to benefit IT students	X		X
2. Work with universities to focus on critical skills	X		X
3. Strengthen IT industry-universities ties	X	X	X
4. Promote collaborations with overseas universities	X		X
5. Establish a Center of Excellence-styled training institute for software industry	X	X	X
Government Support			
1. Establish private-public Council for IT Services Industry	X	X	
2. Initiate E-Government program and adopt national IT projects	X	X	X
3. Focus export and investment promotion efforts on industry	X	X	X
4. Develop and implement IT incubator program	X	X	X
Capital and Financing			
1. Develop/attract IT venture capital funds	X	X[6]	X
2. Make funding available at preferential terms		X	
3. Facilitate IT IPOs on the Amman Stock Exchange	X	X	X
Infrastructure Development			
1. Provide preferential access to high-speed lines and permit private up-links and downlinks		X	
2. Provide competitive pricing on high-speed lines		X	
3. Initiate private sector-led Information Technology Park	X	X	X

[1] Decision made by the Development Committee of the Prime Ministry in Dec. 1999
[2] New legislation amended and passed in extraordinary parliament session
[3] Decision made by the Development Committee of the Prime Ministry in Dec. 1999
[4] Decision made by the Development Committee of the Prime Ministry in Dec. 1999
[5] Decision made in Sep. 1999
[6] EFG-Hermes USD 20 million fund under establishment

Jordan is on the road to becoming an IT success story. By acting on the strategy outlined in the present report, and most importantly, by implementing the detailed action plan in a committed and comprehensive fashion, Jordan's leaders—both in industry and in Government—will play instrumental roles in strengthening the country and creating a limitless world of opportunities for generations to come.

Chapter 1

INTRODUCTION

The information technology revolution now sweeping the world, has the potential to transform the traditional development paths of countries. In just the past two decades, the Information Technology (IT) industry has grown to be the principal driving force behind the world economy, with benefits that are only now being understood. The rapid growth and accelerating pace of technological innovation—the central characteristic of the IT industry—offers enormous opportunities. As with the Industrial Revolution before, the timing, positioning and actions of nations will determine those who will benefit from this Knowledge Revolution, and those that will be left behind. The situation calls for carefully thought-out strategies and actions, demanding the attention of leaders in every nation. It also creates a great sense of urgency, since delay will lead to incalculable opportunity costs, making catching-up ever more difficult.

1.1 BACKGROUND

This report presents a national strategy for Jordan to develop a vibrant, export-oriented Information Technology Services sector. The strategy lays out the main thrusts to bolster the country's nascent IT sector and maximize its ability to compete in local, regional, and global markets. It takes a critical look at Jordan's strengths and weaknesses vis-à-vis other relevant competitors. Most importantly, it outlines a clear **action plan**, specifying actions to be implemented—by the private sector, the Government, and by other stakeholders—to ensure a favorable place for Jordan in the knowledge-based economy of the future.

The strategy responds to a request to the IT industry leaders by His Majesty King Abdullah II on June 30th for a concrete proposal aimed at strengthening Jordan's IT sector. In response, a core group of members of the Jordan Computer Society (JCS) devised the **REACH initiative**, a comprehensive framework that embraces actions in terms of:

- **R**egulatory Framework
- **E**state (Infrastructure)
- **A**dvancement Programs
- **C**apital
- **H**uman Resource Development

In crystalizing this plan for development of the IT industry, the JCS received technical support from the Access to Microfinance and Improved Implementation of Policy Reform (AMIR) project of the United States Agency for International Development. The strategy and action plan was developed through an intensive consultation and research process with Jordanian IT industry leaders and international and domestic consultants over the past month.

1.2 SOFTWARE AND IT SERVICES: THE CORE FOCUS OF JORDAN'S IT STRATEGY

The strategy focuses on the **Software and IT Services sector**, which comprises one of the most dynamic and fastest-growing parts of the IT industry. Global sales of software and IT services

has grown at double-digit rates for the past decade. For Jordan[2], this focus makes sense due to several reasons:

- **Low start-up capital requirements**. This makes it easier and less risky for market entry by Jordanian firms, even small outfits formed by individuals.

- **Jordan's favorable location and position in the regional market**. Its talented workforce, bilingual Arabic/English language capabilities, extensive relationships in the region, and time-zone locational advantages, favorably position Jordan with respect to potential competitors.

- **Human-resource intensity**. Software and IT services require skilled human capital. Jordan's relatively well-educated workforce stands as a comparative advantage for these activities. Ample numbers of students are enrolling in computer-related disciplines; there is a natural inclination and enthusiasm for developing IT skills that owes much to the country's relatively open and liberal environment.

- **Not affected by distance or transportation constraints**. Unlike manufacturing and tourism that are affected by transportation mechanisms, software services are a "distance-less" industry. Its inputs and outputs are transmitted electronically.

These factors suggest that pursuing accelerated software and IT services development is not so much a choice, as it is a necessity. As seen in the Box below, the strategy shall have significant spillover benefits and multiplier effects.

SOME BENEFITS OF ACCELERATED IT SECTOR GROWTH

Economic Benefits
- Increased employment of professionals
- Exports/foreign exchange generation
- Foreign direct investment
- Government revenues

Social Benefits
- Empowered population
- Improved public services
- Better education

Strategic Benefits
- Greater efficiency of Government
- Creation of a Knowledge-base economy
- Enhanced economic competitiveness
- Less dependent on traditional markets

1.3 METHODOLOGY

This report was prepared through a partnership between members of the REACH Initiative and joint team of international and local consultants over a period of a month. The methodology included several key elements:

- **Strategic planning sessions**. Key representatives of Jordan's IT industry participated in brainstorming, focus groups, and other types of strategic planning sessions.

- **Survey of local software and IT service providers**. Lack of reliable statistics on the size and activities of this sector made it necessary to conduct a quick survey. Aside from a formal questionnaire sent to over 40 firms, the consultants made telephone calls, and in several cases interviews with representative firms

[2] The strategy does not directly address the IT hardware (H/W) sector, although its implementation will work in favor of attracting foreign investment and improving the overall climate for H/W manufacturing activities. Hardware has been an important sector for some nations known for being IT success stories (e.g., Ireland, Singapore, and Israel), but it has not been essential for others (e.g. India). This is good news for Jordan, whose IT hardware sector is presently undeveloped—although it may hold serious potential for the future.

- **Collection of other local data**. A team of Jordanian consultants undertook a concentrated data gathering effort, to ensure more complete information about the IT sector performance and factors that affect its performance.

- **Collection of international data**. A team of international consultants gathered information concerning conditions and trends within the software and IT services sectors of Ireland, India, Israel, and Egypt for comparison. This included information on trade, investment, factor costs, regulatory aspects, and both physical and human infrastructure data.

- **Formulation of a draft strategic plan**. This was done based on the results of elements 1 through 4 above. Industry representatives met two times to confirm and prioritize key recommendations in terms of an action plan. A presentation was then made to solicit feedback from industry representatives—i.e., to "test" the plan based on their insight and experience. The plan was adjusted to reflect these comments.

This initial strategic planning process culminated in the present report and associated annexes. By the end of August of 1999, leaders of the REACH initiative hope to present their findings and recommendations to H.M. King Abdullah II, and to other key policy makers and leaders interested in the role of information technology in Jordan's future.

1.4 ORGANIZATION OF THE REPORT

Following this introductory chapter, the report is organized as follows:

- **Chapter 2** examines IT industry **regional and global markets and trends**. It includes a summary of **market opportunities for Jordan's IT sector**, based on these markets and trends, as well as on comparative studies summarized in the subsequent chapter.

- **Chapter 3** presents a description of **Jordan's competitive position**, including benchmarking of key parameters to assess relative strengths and weaknesses vis-à-vis relevant regional and global competitors.

- **Chapter 4** outlines the **strategy and action plan** proposed to make Jordan a regional IT leader, drawing upon the findings summarized in chapters 1-4, along with additional analysis. It also provides an indication of expected economic and revenue impacts of implementing the plan.

- **Annexes** include: A) an assessment of Jordan's legal and regulatory framework as it affects IT activities; B) an evaluation of IT Human Resource Development issues in Jordan; C) a review of Technology Park development experiences; D) summary of the results of the IT industry market survey; and E) an indicative economic and revenue impact analysis of implementing the proposed strategy and action plan. These annexes are presented as a separate stand-alone report, which should be considered an integral part of the overall strategy.

Certain changes or updates to this strategy may be required as Jordan moves forward with its implementation. It should therefore be seen as a work in progress (the "Jordan IT Strategy version 1.0") which can be adjusted and re-issued in the months and years to come.

1.5 ACKNOWLEDGEMENTS

Consultants[3] working as part of the USAID-funded AMIR program served as the primary authors of this report, collaborating and working closely with the members of the REACH initiative and other members of the JCS. The consultants wish to acknowledge the hard work and contributions made by the members of the REACH Initiative:

- Ratib Abbas
- Abdul-Khalik Al-Ashi, Raed Arabi Computer Corp.
- Imad Ayoub, Global One
- Randa Ayoubi, Rubicon
- Mamoun Badran
- Usama Al-Barghouthi, CEB
- Outhman Bazyan
- Mahmoud Hassan, Autographics
- Marwan Juma, NETS
- Karim Kawar, IDEAL Group
- Hani Kayali
- Khalid Khilani, CEB
- Taiseer Khorma, Comcent
- Abdul Majeed Maraqh
- Imad Malhas
- Nabil Mushahwar, TISGroup
- Laith Qasem, Jordan Technology Group
- Majied Qasem, One World Software Solutions
- Ibrahim Qasmia, Techno Sys
- Ahmad Sacca, CSC
- Zayad Safi
- Mr. Samara
- Ahmad Tantash, TISGroup
- Mechail Wakeleh
- Adel Younes, Al Khalidi Medical Center
- Hanna Zaghloul, IDEAL Group
- Hatam Zeine, Zeine Technological Applications

Thanks are also due to every other JCS member and IT entrepreneur who invested their valuable time and energy to help support the effort. We are also grateful to the Jordanian U.S. Business Partnership (JUSBP, responsible for survey implementation), Steve Wade of AMIR, and USAID for their technical direction and support.

Members of the REACH initiative express their thanks and highest regards to His Majesty King Abdullah II, whose recognition of the IT sector's critical role in Jordan's future helped move the REACH initiative to its present stage. The King's leadership and vision creates a favorable environment for the implementation of the present strategy, as well as other important putting initiatives Jordan on a rapid path of economic development.

[3] Principal members of the AMIR consulting team included: **The Services Group (TSG)—**Kishore Rao, Vincent Ruddy, Bruce Brorson, Claude Baissac, Jim O'Gara, Markus Mueller; **CDG/Al-Jidara**—Ramzi Kawar, Linda Kawar, Maher Abu-Taleb, Rasim Abderrahim, Said Abu Shaar; and **International Business Law Associates**—Salah Al Bashir, Dana Janbulat, Ahmed Anani.

Chapter 2

THE SOFTWARE AND INFORMATION TECHNOLOGY SERVICES INDUSTRY: MARKETS AND TRENDS

2.1 DEFINING THE INDUSTRY

The IT industry spans a wide range of products and services, comprising one of the largest and fastest growing industry sectors in the world. New technologies, and the convergence of previously distinct market segments, (e.g., telecommunication devices, software, computer technology, and content-oriented industries such as broadcasting and publishing) have led to a substantial deepening and widening of the sector in recent years. Due to its size, growth, and strategic implications, IT has become a top priority for leading companies and countries around the globe.

IT increasingly impacts other sectors due to its pervasive nature and scope. The best example of this is the Internet, and more specifically, e-commerce. In 1998, approximately US$43 billion in commercial transactions took place on the Internet in the United States alone. By 2003, the amount is expected to top US$1.3 trillion.[4] Information technology is presently transforming entire industries from manufacturing to farming. Audio and video entertainment industries are also going through dramatic changes as new products emerge, and as the Internet and data compression technologies create entirely new distribution channels and bandwidth requirements.

Software and IT Services

Software: The term software refers to the sets of instructions required to make computers and other IT hardware work and communicate. As seen in Table 2.1, one can group software into six main categories: 1) general applications; 2) customized vertical applications; 3) development platforms; 4) development tools; 5) operating systems; and 6) utilities.

Table 2.1: Principal Software Product Categories

General Applications	Custom Vertical Applications	Development Platforms	Development Tools	Operating Systems	Utilities
Client-Based: Word processors Spreadsheets Database Internet applications	Examples: Insurance applications Banking applications Enterprise Resource Planning	Examples: SQL SAP Oracle	Examples: C++ Visual Basic Java Case tools Multimedia development tools (Author Ware, Director, Graphics tools, etc.)	Examples: MS DOS Apple Mac OS UNIX LINUX Embedded OS Windows NT	PC-Based: Virus protection Security utilities Memory management Other user convenience utilities
Server-Based: Examples: Email Messaging Workflow Knowledge mgmt. Groupware					Server-Based: Virus protection Fire walls Intrusion protection Management counsel programs (e.g., Net IQ)

[4] Source: Forrester Research, as quoted in the Economist (July 24th, 1999).

Software can be either **packaged** or **customized**. Packaged software is generically designed and configured so that a broad range of users can use the same program without significant adaptations. It is often sold in conjunction with licensing agreements; once developed, it can be sold *en masse*—customers simply buy packaged software "off the shelf" and install it. Customized software, on the other hand, is developed to meet specialized needs of individual clients. The end result is a product, but to produce it requires the services of design, programming, testing, updating and usually training, every time the software is sold to a new client (see description below). For this reason, customized software may be seen as a service rather than a product. Often, software originally developed as a customized application can be turned into a packaged product—again, causing ambiguity in terms of product/service definition.

IT Services: These may include basic services such as consultancy and training services related to the installation and use of computer and software systems, and a wide range of software implementation services (e.g., setting up local area or wide area networks, e-mail systems, and other types of software for businesses). More specialized types of IT services include such activities as integrated system design, secondment of resources ("body shopping"), localization, software implementation, data processing services, data conversion, voice center operations, and other forms of remote processing (Table 2.2)

Table 2.2: IT Related Services—Some Examples

	Offshore Programming	Localization	Data Conversion	Voice Center
Low-End	Coding and development	Arabization Translation	Key punching Data entry	Reservation Centers
High-End	Outsourcing Content development Back-office operations Multimedia/Graphics	Full localization	Dbase management Data mining/ warehousing GIS vectorizing Technical transcription Deposition summary	Telemarketing Insurance claims processing Help desks Integrated call centers Telemedicine

A rapidly growing sub-category of the overall IT-related services industry is Remote Processing or Teleworking. The segments of this industry—spanning all types of backoffice operations—represent the third stage of globalization of industry. In the 1970s, goods were manufactured locally, support services provided by domestic vendors. In the 1980s, the manufacturing of goods were globalized, spearheaded by the investments of multinationals worldwide. In the 1990s, goods are manufactured and marketed globally, but business support services are also provided from multiple international sources. This has resulted in the movement of a range of labor- and knowledge-intensive operations offshore (Table 2.3).

Table 2.3: Examples of Remote Processing IT Service Activities

Call centers: Set up by international firms to answer customer queries from around the world	**Medical transcription**: Overseas doctors tape patient information on dictaphones that are transcribed for documentation.	**Content development**: Typically involves creating public domain information for overseas clients-- e.g., designing & maintaining web pages.	**Insurance claims processing**: Large insurance companies face mountains of client claims; well-defined guidelines allow them to be processed anywhere.
Data conversion: usually characterized by converting passive information into organized data fields on which queries can be run. Of use across industries.	**Back-office operations**: This includes such things as payroll accounting, airline reservations, internal auditing, credit appraisals, etc.	**Deposition summary**: Witness depositions in the U.S. run into thousands of pages. Legal firms need to summarize these, which is labor-intensive.	**Geographical Information Systems** (GIS): This includes creating digitized maps of townships, utilities, roads, etc. Considered a high-end remote processing.

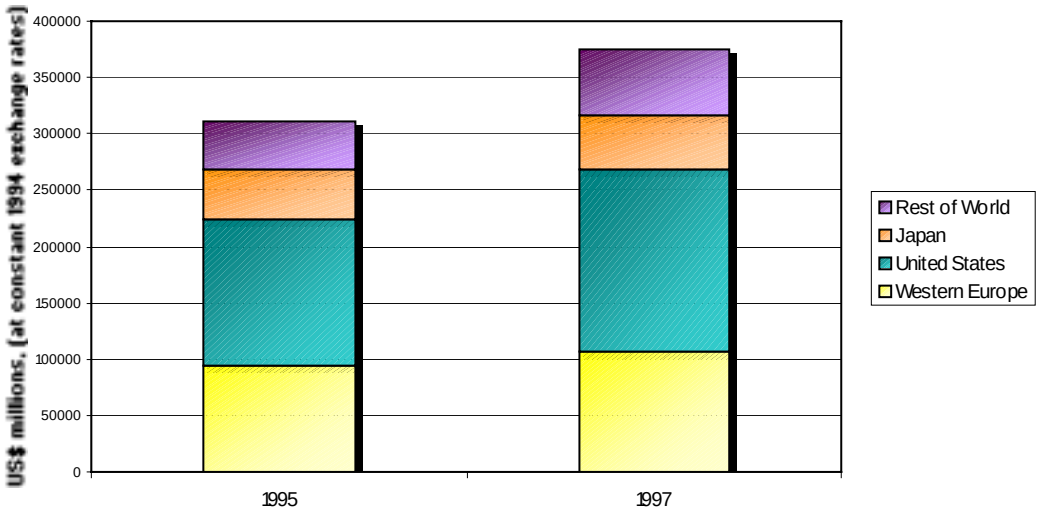
Source: Businessworld, August 7-21, 1999.

2.2 GLOBAL MARKETS & TRENDS

Profile of Global Market

The world market for software and computing services topped US$400 billion in 1998, and will likely reach upwards of US$620 billion or more by 2002. The United States comprises the single most important market, amounting to almost half of the total. The U.S. market continues to expand relatively quickly (11.3% between 1995 and 1997) due to continuing dynamism of its overall economy. The countries of Western Europe comprise the second most important market for this sector, although growth rates (6.6% between 1995-97) have been less dramatic than in the U.S.—again a reflection of relative economic performance.

Figure 2.1: World Market for Software and Computing Services, 1995-97



Source: Based on data from European Commission, Panorama of EU Industry '97

Emerging economies—particularly those in Asia—have experienced the highest market growth rates for software and computing services. Average annual growth between 1995 and 1997 reached 18.3 percent for these countries, which include the Middle East, Asia, Africa, and Latin America. Their overall market size is still dwarfed by the U.S. and Western Europe, but they are clearly on a path of rapid growth.

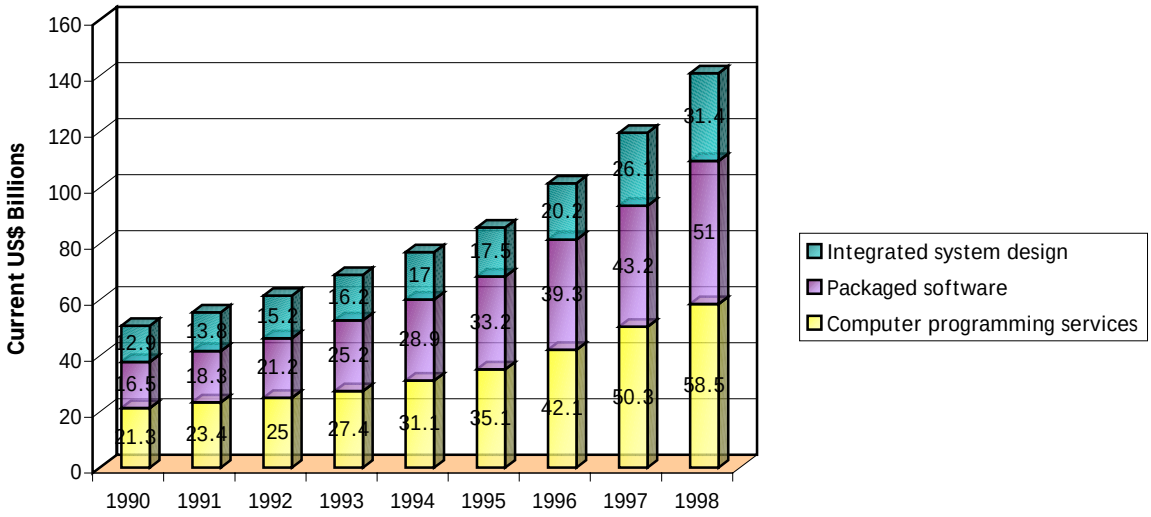
In terms of software products and services, customized software-- the programming services segment of the industry-- accounts for the largest share of industry sales (41.5% in the U.S. market in 1998). However, packaged software (36.2% of industry sales in the U.S.) has emerged as the fastest growing market segment in terms of software products and services, with average annual growth reaching 15.1 percent between 1990 and 1998. Integrated systems design services grew at 13.5 percent during the same period (see Figure 2.2).

Emerging Products and Services

For the foreseeable future, the Internet will drive explosive market growth in a wide range of related software and IT service activities. On the services side, **Internet service providers (ISPs)** will experience continuing expansion. The total market for Internet access and value-

added services (valued at US$25.5 billion in 1998) is expected to increase to US$154.5 billion by 2003. By 2003, some 545 million Internet user accounts are expected to exist globally[5].

Figure 2-2: Annual Receipts of Core S/W Industry Companies in the U.S., by Industry Segment, 1990-98



(Source: U.S. Business Software Alliance, 1998)

This will drive growth in ISP related equipment and services. As seen in Table 2.4, sales of these are projected to grow sharply over the next 5 years-- especially **server software**, which will expand more than four-fold by 2003.

Greater Internet access is fueling a boom in **e-commerce related software and services**. At present, there are more than 153 million Internet users worldwide (Table 2.6), a figure expected to reach 320 million by end-2000. Approximately 33% of U.S. Internet users indicate having purchased products or services on line (the corresponding percentage in Arab countries runs at 9 percent, up from 4% in 1997).

Table 2.4: ISP Server Equipment Market, US$millions

	1998	2003	Avg. Annual Growth (%)
Customer care tools	160	700	34.3%
Network security tools	190	880	35.9%
Server hardware	830	1,830	17.1%
Server software	270	1,400	39.0%
Caching engines	190	880	35.9%

Source: Datamonitor's "Powering the Internet Revolution: 1999-2003"

Strategic Internet software development, such as **Internet protocol (IP) applications** will also face positive market conditions, including custom-built applications for both commercial and consumer segments.

The increasing quantity of information generated and used in global commerce is driving rapid growth in software and services related to **"knowledge management systems"** (e.g., **data warehousing, data mining**, etc.). This is one of the hottest growth sectors for U.S. software exports to Europe and other principal markets. Other types of business-related software

Table 2.5: Internet Users by Region (February 1999)

Region	Users (millions)
Africa	1.14
Asia/Pacific	26.6
Europe	33.4
Middle East	0.78
U.S. & Canada	87.0
South America	4.5
Total	147.0

Source: NUA

[5] Source: Datamonitor

experiencing rapid growth include **package implementation** (ERM, supply chain and customer management), **strategic Internet services**, and **business process outsourcing**. **Networking systems integration** also deserves mention.

Year 2000 remediation service providers are presently having a hard time keeping up with demand. This is expected to be an important market segment both before and after January 1, 2000, as old software is made compliant or replaced by new software. **Euro currency conversion** is another growing area as the EU embraces a single currency.

This year has also seen significant energy going into **Open Source Software Development** (a trend likely to accelerate in upcoming years). Of particular relevance is the increased industry acceptance and adoption of a shareware operating system called "Linux" (origins in Finland). Users are now developing every type of software imaginable. Industry leaders such as IBM and Oracle have already released modified versions of their software that will run on Linux. Localization/Arabization of Linux and Linux software as well as the development of original software presents important opportunities for regional software houses, which is already beginning in Jordan.

Finally, a wide range of **remote processing services** appears to be particularly well positioned for explosive growth (see description above). Untapped demand for these services is currently estimated to be very high—research done by McKinsey & Co. indicates demand on the order of US$250 billion—larger than the comparable figure for the entire global software industry.

2.3 REGIONAL MARKET & TRENDS

Profile of Regional Market

As seen in Table 2.5, the Middle East remains relatively "unconnected" in terms of the Internet. This reflects the as-of-yet immature market for computers, software, and IT services in the region. Internet use and e commerce activities remain in their infancy.

It is difficult to find reliable statistics on IT market size in the region, a problem compounded by rampant software piracy. What little information does exist, however, points to a situation of high growth and dynamism, in spite of the relatively small base. For example, packaged software sales in Egypt, the Gulf States, Saudi Arabia, and Turkey totaled around US$1.2 billion in 1997[6]. Sales growth during the same year is estimated at 18.6 percent/year, which coincides with emerging market growth rates presented in Section 2.1 above.

Software Market Data: Saudi Arabia, Egypt and Israel

Saudi Arabia
$420 million local software sales, 10% growth
$1.2 billion overall IT market (1998)

Egypt
$50 million local software sales, 35% growth
$250 million overall IT market (1998)

Israel
$800 million local s/w sales, 10% growth
$1,500 million s/w exports, 50% growth (1998)

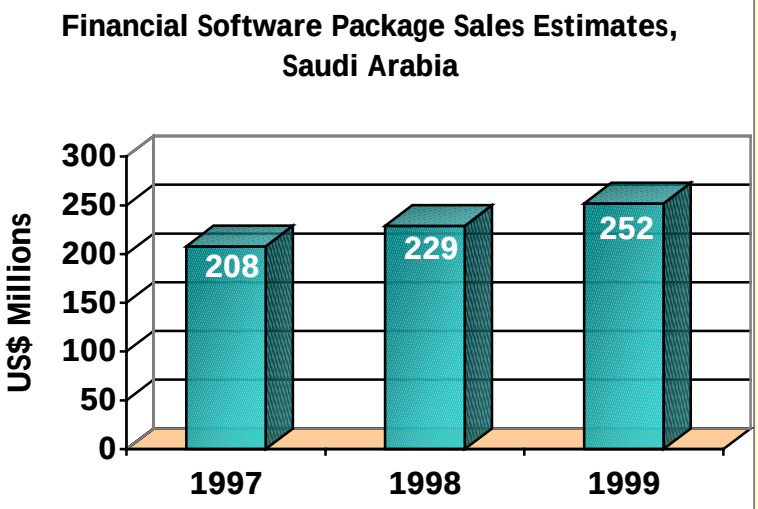
Source: Country commercial guides & Internet sources: Israel Assoc. of S/W Houses & MoI&T

On an individual country basis, one observes market size and growth rates which correlate roughly with population and/or per-capita wealth figures. Israel clearly represents the largest market in the region, with over US$800 million in software sales in 1999. In Saudi Arabia and other countries of the Gulf, markets are expanding rapidly, particularly in recent months due

[6] Source: IDC estimates, as presented in Price Waterhouse/Coopers & Lybrand; figure also includes sales to South Africa

to liberalization of Internet controls, Year 2000 remediation efforts, and large investments being made by financial institutions, military units, and other large institutional clients. This market makes up over half (55%) of overall IT expenditures in the country.

Figure 2.3: Saudi Financial IT Market Profile



Source: Middle East Business Intelligence, September 5, 1998

Best Sales Prospects, Saudi Financial IT Market

- Financial Software
- Marketing Systems
- Open Architecture Systems
- Internet/Intranet Solutions
- Analysis Tools
- Decision Support Tools
- Consulting/Training
- MIS Systems
- Financial EDI Systems
- Financial Consultation
- Networking Services
- Disaster Recovery S/W
- Auditing S/W Packages
- Accounting
- Office Automation Packages

Emerging Products and Services

Aside from banking sector software and IT services, several other market niches offer expanding opportunities in the Middle East region. Jordanian firms already active in the region (particularly in the Gulf States) point out the following types of opportunities:

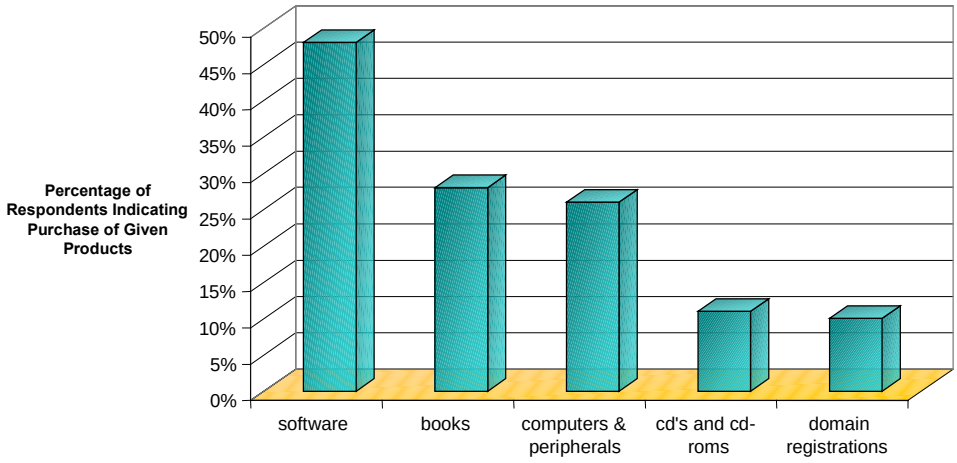
- General Insurance software (customized, leading to packaged applications; main competition is from Lebanon, Egypt, South Africa, India & France)
- Web-authoring
- Military logistics
- IT consulting
- Arabization and localization of North American & European S/W applications
- Hospital systems (done first locally then packaged and sold regionally by Jordanians)
- Health insurance claims
- Multi-media, educational software (both packaged & customized applications)
- Games & Other Entertainment (currently pc-based, but increasingly Internet-based)
- Terminal & printer emulator & arabization
- E-commerce

Recently obtained statistics on regional e-commerce suggest that this activity is quickly developing into a serious growth sector. In the 12 months leading up to April of 1999, Arab consumers are thought to have spent approximately US$95 million on goods purchased over the Internet.[7] According to a survey, nine percent of Internet users reported making an online

[7] Source: Dabbagh IT Survey, 1999. This figure would appear somewhat exaggerated given the 338,200 estimated total subscribers, 2.5 users/subscription ratio (4 in Egypt), and cited percentages of users making purchases in the region. Additional caution is warranted due to the low percentages of users in the region with access to credit cards. One possible explanation for this is inclusion of Israeli figures, although this could not be confirmed with the authors of the survey.

purchase in 1999, up from 4 percent in 1997. More than 80 percent of purchases were made from international vendors—a reflection of the lack of e-commerce capabilities among Arab vendors, but at the same time, a clear sign of the tremendous market potential for regional IT producers such as Jordan. As seen in Figure 2.4, important products sold via Internet in the Arab market include software (purchased by 48% of respondents), books (28%), computers and peripherals (26%), CD's and CD-ROMs (11%), and domain registrations (10%).

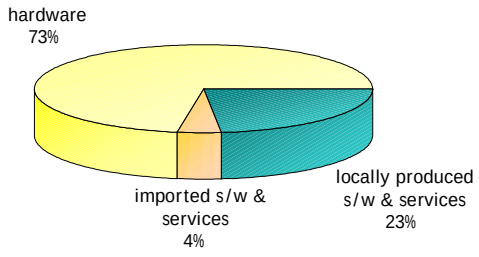
Figure 2.4: Principal Products Sold in Arab Market E-Commerce



2.4 JORDANIAN MARKET & TRENDS

Profile of Local Market

Figure 2-5: Breakdown of Jordan's IT Market (1997-98 average)



The total market for IT hardware and software sales in Jordan is estimated to be approximately US$60 million,[8] including the Government and Commercial sectors. According to various sources of data, about 27% of this figure corresponds to sales of software and IT services, while 73% corresponds to computers and other hardware. These figures should be considered with a large degree of caution, due to the lack of accurate statistics and high degree of software piracy prevalent in the local market. However, they serve to give a general sense of the potential of Jordan's market.

[8] This figure is based on several estimations and assumptions. Software imports were assumed to be US$2 million (based on estimates of local industry experts). To this were added estimates of locally produced software sales based on a survey of 23 principal software houses. Hardware imports were obtained from Jordanian customs statistics, with the exception of networking & communication equipment, where industry expert estimates were used due to distortions in customs statistics caused by inclusion of co-axial cable. There are no purchases of locally produced hardware in Jordan, except for locally assembled computers whose sub-components are captured by customs statistics (although values do not reflect final price to buyers). Averages were taken on figures from 1997 and 1998, due to large h/w import figures in 1997 thought to be caused by a spurt of government procurement. Finally, a growth rate of 27% was applied to the average figures for 97 and 98 to obtain the current total market size.

The IT market is estimated to be growing between 15 and 30% per year. A large part of this growth is due to increased sales of software and other IT services. As in the case of other regional markets, several large institutional clients have been investing in new IT systems, particularly banks, hospitals, insurance companies, and hotels. Local industry leaders point out the following as the most significant products and services :

- Accounting packages
- Imaging and work flow applications
- Health insurance packages
- Religious S/W e.g. the Holy Koran and its various interpretations
- H/W and S/W integrated packages such as terminal emulation
- Multimedia
- Software conversion from 3rd to 4th generation languages
- System integration
- Some logistics and military software
- WEB enabled application development; (being performed well in Jordan, but lacking in most Arab countries
- Games
- Training

Emerging Products and Services

Again, the lack of reliable statistics makes it difficult to estimate growth rates of specific software products and IT services. However, focus group sessions held with industry represented elicited the following ideas in terms of which products/services are seen as holding great potential for future growth:

- Conventional business applications especially for the insurance, hotel, accounting, manufacturing and other industries
- Enterprise Resource Planning for manufacturing, telecommunications
- Customized applications for insurance, education, multi-media, medical, Islamic Banking, and other niche markets
- Content development
- Web development
- Arabization and localization of specialized applications
- Data warehousing and data mining

These categories obviously encompass a wide range of software applications; both customized and packaged. They also imply continuing opportunities for IT service activities, mostly at the mid to high end for large institutional and business clients, and at the lower end for smaller businesses and consumer segments.

2.5 OPPORTUNITIES FOR JORDANIAN FIRMS

The information reviewed in the previous sections of this chapter implies substantial opportunities for the Jordanian IT industry. Several pertain to the area of **software development**, which has emerged as a major opportunity for software houses in emerging IT countries due to labor shortages in primary markets. In Jordan's case, limited software development capacity in the regional market—especially the Gulf States—is opening up additional opportunities for this activity.

Labor shortages in primary markets have become acute. In the U.S., for example, software companies created demand for 135,000 new positions in 1996, while U.S. universities only graduated 36,000 computer science graduates. As a result, wage rates for skilled computer professionals are expected to increase by 35 to 50 percent by the year 2000. To fill the gap, U.S. firms are outsourcing S/W development to India, Israel, Sri Lanka, Pakistan, Egypt, Russia, Ukraine, Poland, Hungary, and other countries possessing capable IT workforces and infrastructure. Europeans are also experiencing tight labor supply, a problem exacerbated by Eurocurrency introduction and Y2K-stimulated demand. *Demand has become so high-- especially for higher quality software programming services-- that offering low labor costs has become less important than simply being able to execute larger projects on a timely basis with sufficiently high quality and documentation standards.* This means that competition from countries such as India should not be seen as an insurmountable obstacle.

Offshore outstanding opportunities for Jordanian S/W development firms

To better understand Jordan's possibilities for offshore outsourcing, it is necessary to examine the software development process and consider the potential for local firms to provide services at distinct stages therein. This process can be divided into 6 main stages: 1) needs analysis & functional specification; 2) design; 3) coding; 4) testing; 5) implementation/maintenance; and 6) customization.

As seen in Table 2.6, for four of these stages, **Jordan already possesses sufficient conditions for a competitive offshore outsourcing industry for software development**. For two of these four—coding and testing—the potential for Jordanian firm outsourcing opportunities is high. A handful of Jordanian companies already have proved this potential by undertaking off-shore outsourcing activities for discrete development stages—particularly coding and testing.

In a limited number of cases, Jordanian firms have demonstrated an ability to span most if not all stages of development. For example, one company succeeded in developing an Apple-based word processor "from scratch" and has been undertaking complex software development assignments on behalf of large European and U.S. clients. Another has provided out-sourcing services including higher-end software consulting and design for U.S. based clients.

While they remain hindered by various limitations in the local environment for software development (see Chapter 3), these and other Jordanian firms are clearly headed in the right direction in terms of becoming globally competitive players in the IT industry. Upon implementation of an aggressive IT strategy (see Chapter 4), the number of these firms will increase, and within 2 to 3 years, Jordan should be firmly positioned on the "radar screen" of major software developers--for s/w development outsourcing contracts, as well as joint ventures and in some cases acquisitions by foreign investors.

Jordan's Potential for Other IT Services

In addition to software development, Jordan's IT industry can undertake other IT services for which demand is projected to be high in both global and regional markets (see Table 2.7).

As seen in Table 2.7, in the small but important **regional market, Jordan's potential is medium to high** for such IT services. Currently, however, such activities are somewhat limited. Aside from software development (addressed in Table 2.6) and various types of consulting services, few Jordanian IT firms have made a serious push into these value added IT service activities in the region or beyond.

In the global market, Jordan's greatest potential lies **in high-end remote processing and data management activities**. While this potential is currently considered "medium", a concerted

effort to target this activity and improve infrastructure and firm-level capabilities is likely to yield positive results.

Table 2.6: Jordan's Potential in Off-Shore Outsourcing of S/W Development, by Stage

S/W Development Stages	Labor Skill Requirements for off-shore outsourcing	Per-firm Scale Requirements for off-shore outsourcing	Telecom Requirements for off-shore outsourcing	Jordan's Potential for off-shore outsourcing
1. Needs analysis/functional specification	Very high (requires state of the art knowledge base; solid technical, managerial, and conceptual skills)	Size/scale not a primary factor	Basic connectivity is sufficient (dial-up ISP service, not cost sensitive)	**Low** in short-term, due to early stage of country's IT sector development and limited resources. Good future potential due to emphasis on education.
2. Design	Very high (requires state of the art knowledge base; solid technical & conceptual skills)	Size/scale not a primary factor	Basic connectivity is sufficient (dial-up ISP service, not cost sensitive)	**Low** in short-term, due to early stage of country's IT sector development and limited resources. Good future potential due to emphasis on education.
3. Coding	Medium (requires qualified programmers + project managers w/ tech. documentation skills)	Medium scale usually required (50+ employees for typical operation, corresponding equip.)	Large bandwidth & high speed subscriber lines at competitive prices	**High** in short term, provided strengthening & broadening of IT education program offerings, formation of larger firms, & competitive pricing for high-speed lines
4. Testing	Low to Medium (requires basic computer operation skills)	Smaller firms (e.g. 10-40) can be competitive	Internet app. s/w, large bandwidth & high speed subscriber lines at competitive prices For stand-alone app. s/w: Basic connectivity is sufficient (dial-up ISP service, not cost sensitive)	**High** in short term, provided industry establishes partner relationships w/ overseas consulting & s/w development companies. But lack of standards is the major drawback.
5. Implementation/ Maintenance (maintenance = correction of errors following product delivery and changes in specifications)	Medium (requires qualified programmers + project managers w/ tech. documentation skills)	Medium scale usually required (50+ employees for typical operation, corresponding equip.)	(Same as testing above)	**Medium** in short term. Sensitive to: ability to partner w/ overseas consulting & s/w development companies. Limited prevalence of original s/w development in Jordan is a limitation
6. Customization (adaptation/re-coding of an existing software product to meet specific needs (e.g., Arabization, adopting s/w to different platform, etc.))	Medium (requires qualified programmers + project managers w/ tech. documentation skills)	Medium scale usually required (50+ employees for typical operation, corresponding equip.)	(Same as testing above)	**Medium** in short term. Sensitive to: ability to partner w/ overseas consulting & s/w development companies. Limited original s/w development in Jordan is a limitation at present.

Table 2.7: Jordan's Potential in Other IT Service Categories

Type of IT Service	Labor Skill Requirements	Per-firm Scale Requirements	Telecom Requirements	Jordan's Potential
Consultancy services (including training & seconding of IT personnel)	Medium to high (requires solid knowledge base; technical, and managerial skills)	Size/scale not a primary factor	Basic connectivity is sufficient (dial-up ISP service, not cost sensitive)	**High** within the region (small but interesting market niche for which Jordanian firms hold advantages); **Low** outside the region, due to strong competition
Low-end remote processing/teleworking (e.g., key punching, data entry)	Low to medium; limited English language skills OK, but inexpensive labor a must	Medium to large size required, with strong quality control capabilities	Large bandwidth & high speed subscriber lines at competitive prices	**High** regionally for Arabic language-dependent work (small but interesting market niche for which Jordanian firms hold advantages); **Low** globally, due to strong competition from low wage countries. High for language dependent work
High-end remote processing and knowledge management (e.g., Dbase management, data mining/ warehousing, GIS vectorizing, transcription, content creation)	Medium to high (requires solid knowledge base, technical, and managerial skills; less wage sensitive)	Medium to large size required, with strong marketing & quality control capabilities	Large bandwidth & high speed subscriber lines at competitive prices	**Medium** both regionally & globally, provided competitive priced high-speed internet connections, & strengthening of local firm capabilities (including ability to market to overseas consulting companies & guarantee high quality levels)
Voice Center operations (e.g., technical assistance centers (TACs) for service companies)	High (requires solid knowledge base, technical, and managerial skills combined with strong English language capabilities; moderate sensitivity to wages)	Large size required, with strong marketing & quality control capabilities	Large bandwidth & high speed subscriber lines at competitive prices; cross-border toll-free telephone numbers	**Low to Medium** in region due to lack of cross-border toll-free telephone service. **Low** in global market, due to language limitations & strong competition from countries such as India, Philippines, etc.

Local Market Opportunities

As discussed in Section 2.4 above, several opportunities exist in the local market. However, small market size makes it difficult for local firms to grow and achieve economies of scale while focusing soley on domestic activities. Current Government procurement practices exacerbate this problem--according to industry representatives, up to three quarters of of IT service requirements are sourced from the Royal Scientific Society or other public agencies.

A unique opportunity exists to change this situation in a way that will greatly benefit both the Government and the local IT industry. Jordan can follow the lead of other advanced and emerging countries and become the first in the region to establish an "e-Government". By this we mean a comprehensive effort to have public agencies embrace information technology strategies to improve the provision of services and information to the public. Undertaking such an initiative, and most importantly, using competitive procurement mechanisms to spur private sector involvement, would have an immediate impact at three levels:

IT industry development: stimulation of new technology development and economies of scale that would help them in regional and international markets.

Improved efficiency and image of public services: for example, allow use of the internet to pay taxes and fees; facilitate more rapid processing of customs documentation; and create a sense among citizens of improved quality and modernization of their Government. Efforts to reduce the size of the public sector will be greatly assisted by broader and more effective use of information technology.

Large promotional impact. By being the first in the region, Jordan would distinguish itself from other countries, receiving attention from international media and foreign IT firms.

The benefits of this approach suggest that the Government should make it a top priority in terms of actions it will take to spur Jordan's IT industry. A major element of this is to revise the current Government procurement and selection process to shorten the time period. Government officials should work with contractors to ensure project success. The evaluation of public officials should be based upon successful project implementation. It is therefore included as a key element within the action plan presented in Chapter 4.

Chapter 3

JORDAN'S COMPETITIVE POSITION

3.1 INTRODUCTION

Jordan's software and information technology services industry is small, fragmented and mostly inward-oriented. Yet, the industry is experiencing rapid growth, becoming increasingly export-oriented, and developing the necessary capabilities to compete on a global basis.

This section provides a brief description of the status of the Jordan's Software and Information Technology Services industry, and an analysis of its competitiveness relative to selected regional and international locations. This is assessed in terms of:

- Industry capabilities
- Regulatory framework
- Assistance programs
- Human resources
- Infrastructure and physical facilities

Unfortunately, accurate data on the size and scope of the local industry are lacking. Of the 400[9] companies that are registered as "computer firms" with the Ministry of Industry and Trade (MIT) and the JCS, most are either distributors of computer hardware, re-sellers of packaged software, or engaged in both activities. Most IT companies officially registered and authorized to practice commercial activities in the market sell and service computer hardware and peripherals. Other services include software development, training, and sale and support of packaged software products.

To provide a more accurate indication of the industry, a brief survey of some 45 companies engaged in software and IT services was conducted by the Jordan-US Business Partnership, under the direction of the JCS.[10]

3.2 INDUSTRY STRUCTURE AND CAPABILITIES

Overview

Compared to many other countries, the Software and Information Technology Services industry in Jordan is at the very early stages of development (Table 3.1). At present, there are some 50 companies primarily engaged in software, Internet web site and content development and related services; of these, perhaps only a dozen may be considered software developers. These 50 firms together employ about 1,250 people, with an average of some 25 employees per firm.

The industry is predominantly selling to the domestic market and export sales are low. According to our data, reported total sales of software and related IT services were about US$22.3 million in 1998, 66 percent of which was to the local market. Exports of software services are low, but growing rapidly. According to survey estimates, reported exports in 1998 were US$7.5 million and are expected to easily double to US$15 million by the end of this year.

[9] This figure should be treated with caution. Several registered companies have gone out of business. Most of these are small shops with low capital bases.
[10] Please see Annex D for a summary of the results of the industry survey. Only 23 companies responded.

Table 3.1: Profile of Software and IT Services Industry—Selected Countries

	Jordan	Egypt	Israel	India	Ireland
Number of Software/IT Services Firms	50	130	300	500	600
Number of Employees	1,250	5,000	10,000	200,000	19,000
Total Sales of Software and IT Services	US$22.3 million	US$100 million	US$1.15 billion	US$4 billion	US$5.2 billion
Number of Employees per Firm	25	38	33	340	32
CAGR of Industry	15%	35%	15-20%	57.4 %	N/A
Total Revenue per Employee	US$17,480	US$20,000	US$115,000	US$20,000	US$275,790
Total Exports of Software and IT Services	US$7.5 million	US$25 million	US$700 million	US$1.7 billion	US$4.9 billion
Export Sales per Employee	US$6,000	US$5,000	US$70,000	US$8,500	US$259,105
Major Export Markets	Gulf countries Saudi Arabia USA EU	Gulf countries Saudi Arabia EU USA	USA EU	USA: 58% EU: 21% SE Asia: 8% Japan/Aust: 4% Other: 7%	EU USA
Major Export Market Activities	Packaged applications Customized applications Offshore programming Multimedia	Packaged applications Customized applications Multimedia Offshore programming	Internet applications E-commerce Development tools Outsourcing CAD/CAM Multimedia	Body shopping Offshore programming Outsourcing ERP Consulting Data processing Multimedia	E-commerce Internet Applications Development Tools CBT Localization Call centers
Top Three Sources of FDI in the Industry	USA UK France	USA EU Japan	USA	USA Japan UK	USA UK Germany
Leading Multinational Investors in Software and IT Services	None	Lucent IBM Oracle Sun Microsystems	IBM Sapiens Cisco Systems Siemens Digital SAP Madge	Microsoft Novell Oracle Computer Associates Adobe Informix	Microsoft Computer Ass Novell Oracle Informix SAP Symantec

Notes: CAGR: Compounded Annual Growth Rate. Data is for 1999 or most recent available. Excludes hardware sales.
Source: Jordanian software industry survey; AMIR estimates; NASSCOM-India; US Department of Commerce.

An increasing number of firms have turned to the export market, especially as previously closed regional markets have reopened, and domestic demand for software services has fallen.[11] Exports have also grown rapidly, by 138% between 1997 and 1998, albeit from a small base. Most exports (85% of total exports) are directed at the regional market, comprised mostly of Saudi Arabia, UAE, Qatar, Yemen and Oman. Sales to the global market are limited.

Foreign direct investment in the industry is very low, with most firms started by Jordanian entrepreneurs. A number of firms have alliances with international firms, but even these are relatively limited.
Most companies are small and undercapitalized, with an average of about JD 20,000/firm. This is the result of several factors, including difficulty in accessing funding.

Despite the small supply base, competition at the local level is fierce because of even smaller domestic demand for computing services. The largest client banks and government ministries tend to staff IT projects internally. Nevertheless, barriers to entry in the industry are low, since capital requirements are relatively small (usually a few workstations and standard office

[11] Lucrative markets in the GCC were closed to Jordanian firms due to sanctions imposed after the Gulf War. Domestic demand for software services fell as a result of the onset of recession in 1996.

automation, at a cost of about US$10,000). Medium-sized companies tend to need minimal customization, and decisions in these firms tend to be mainly cost driven.

Many of these characteristics are common in emerging software locations, particularly in the Middle East area. The Egypt software and IT services industry, for example, has total revenues of about US$100 million, consisting of only about 130 firms, employing 5,000, and generating only about US$25 million in exports directed mostly at regional markets.

But the potential size and vitality of the Jordanian software industry can be seen in reference to established software locations such as India, Israel and Ireland. In less than a decade, these countries' exports of software and IT services have risen to more than billion dollars, employing between 5,000 and 200,000 workers. But even these countries vary greatly in terms of value-added. Average export output per worker in Israel and Ireland is US$70,000 and US$260,000, respectively, compared to only US$8,500 in India. This is the result both of the higher export-orientation of Israel and Ireland, as well as India's concentration in relatively lower segments of the industry.

Market and Product/Service Characteristics

Over 75% of software and IT services are sold to the commercial rather than government market in Jordan. There are no reliable estimates of the local market for software and IT services. The Government of Jordan is the major consumer of software services but this is done primarily by various government departments such as the Royal Scientific Society (RSS) and the National Information Centre (NIC). There has historically been very little procurement from private vendors.

Commercial Market. The commercial market for software services in Jordan is small and highly cost-sensitive. Most end-users of software are banks, insurance companies, hospitals and hospitality groups. There is little appreciation of the value of software. Most companies tend to equate software with hardware, which is experiencing continuous declines in prices internationally. Most end-users tend to maintain large IT departments in-house, unlike their counterparts in other countries that outsource these services.

As summarized in Table 3.2, the commercial market for software development is comprised mainly of customized applications, although several companies have produced high-end, packaged general applications sold mainly to regional markets. These high-quality packages are competitive with world standards. The majority of firms are producing commercial business applications such as:

- Accounting packages
- Imaging and work flow applications
- Health insurance packages
- Religious software (e.g., the Holy Koran and its various interpretations)
- Arabization/localization
- Hardware and software integrated packages such as terminal emulation

Table 3.2: Software Product Concentration in Jordan

General Applications (Packaged)	Customized Applications	Development Platforms	Development Tools	Operating Systems	Utilities
Client-Based: -Arabic word processor -Arabic spreadsheet -Insurance management -Web based applications	-Insurance -Banking -Religious -Health -Logistics -Defense -CBT -Multimedia -Education -Games	None	None	None	PC-Based: -Data compression
Server-Based: -Workflow/ Document management -Messaging					Server-Based: None

- Software conversion from 3rd to 4th generation languages
- System integration
- Logistics and military software, and computer based training (CBT)
- WEB enabled application development
- Multimedia and games to a limited extent

Some of these are being re-configured into packaged, general applications, aimed at regional markets.

Jordan's traditional competition in these markets for customized applications is from Egypt, with its large number of IT companies. But Jordanian IT companies are stronger in quality and after-sale service. Increasingly, new competition is from India, South Africa, EU and other countries, as the GCC market globalizes.

Table 3.3: Software and IT Services Concentration in Jordan

Offshore Programming	Localization	Systems Integration	Data Conversion	Voice Center	Software Conversion
-Coding -Testing -Other outsourcing	Arabization	Limited	-Medical claims processing - GIS/Digitization	None	-3rd to 4th GL

There is an emerging trend towards providing software and other IT-related services aimed at global markets (Table 3.3). Five recent startups are successfully selling high-end products and services (offshore programming and outsourcing) for US and global markets. Some offshore development work is also undertaken for EU and Japanese markets. These companies have reversed the experience of previous ventures with the US market that failed because of the inability of companies to meet job specification and turnaround time requirements.

Other IT-related services such as data conversion and voice center operations are very limited at the present time. A few companies are engaged in medical claims processing and GIS digitizing operations. There are no voice center operations such as call centers due to the lack of 800 numbers in Jordan and the absence of cross-border agreements in this area in the Middle East.

Government Market. The large size of the government sector makes it not only the largest producer and consumer of information but also the largest consumer of information technology in Jordan. The need to establish government-wide information systems requires a high degree

of standardization and compatibility in data models and structures as well as in telecommunications protocols and computing environments. The current situation is characterized by a plethora of more or less proprietary operating systems, communications protocols and computing environments spanning several technology generations. Technology choices are made according to narrowly defined departmental needs and individual perceptions of available options. Even the Arabic language coding used for the representation of Arabic information on computers is not unified, creating additional difficulties and cost when exchanging data or interconnecting systems.

Despite recent efforts to coordinate the acquisition of information technology in Government, the overall process is still cumbersome. Such coordination still revolves around a single vendor or a centralized (and hence heavily bureaucratic) purchasing approval mechanism. Because of these factors, most procurements of IT services by Government have taken a very long time.[12] There is a need for the establishment of industry-accepted information engineering standards for software development work undertaken by or on behalf of the government.

A more critical issue is that at least 75% of the GoJ's software and IT service needs are performed by other government bodies, principally the RSS. Commercial procurement from software vendors is limited largely to donor-funded jobs.

Company Characteristics-Weaknesses and Strengths

Given the lack of demand in the domestic market and the relatively limited access to regional and global markets, it is not surprising that most IT companies are small and engaged in relatively narrow range of activities.

The underdevelopment of the industry is indicated by the fact that only 20% of software companies account for 80% of IT industry revenues. To remain competitive, most firms (as many as 90%) are re-sellers of imported software, and/or are hardware vendors and computer assemblers. Other major characteristics found in our survey sample include:

- **Small size and fragmentation**. Over half of the companies responding to our survey had less than 20 employees, and even fewer engaged primarily in software activities. Total sales per company range from JD 65,000 to JD 80,000 for smaller firms, and JD 1-2 million for larger ones. The median was JD 490,000.

- **Limited capitalization**. Registered capital of these companies ranges from JD 5,000 to JD 1.2 million; only seven companies exceed JD 60,000.

- **Limited collaboration and scale**. Most companies have not collaborated either in the penetration of new markets or in the delivery of services. Most lack the scale necessary to accommodate large jobs; the loss of 10-15 programmers would be sufficient to cease operations in most firms. There is fierce competition in the industry.

- **Limited foreign investment**. There is virtually no foreign investment in the sector. Only one firm in our survey indicated foreign equity participation. Foreign collaborations are generally limited to licensing relationships and strategic alliances.

- **Lack of critical skills**. Companies are hindered by the quality and variety of skills available in the marketplace. Computer science graduates are trained only in (dated) programming languages, and lack critically required skills in marketing, technical writing, project management, graphics, creativity, etc.

[12] An example of this is a recent US$22 million software consulting project for the Jordanian Telecommunications Corporation. The tendering process took three years and was eventually cancelled because of the lack of more than one bidder.

- **Lack of use of leading tools and technologies in project management and operation**. While most companies are using the latest software development tools, leading tools in terms of project management, operation processes, and marketing are not widely in use. In general, there is a lack of appreciation in the industry for a holistic development approach. This is increasingly critical for the success of software and IT operations given the convergence of technologies.

- **High labor turnover rates**. The limited number of experienced professional and the continuing problem of "brain drain" results in very high employee turnover rates, estimated to average 30-40% per year.

- **Lack of quality assurance**. Most companies have not systematically implemented software quality assurance programs. Testing is undertaken on an ad hoc basis.

At the same time, there are a number of significant *internal* strengths in the industry, as revealed in focus group sessions conducted with industry leaders. The most significant of these include:

- **Availability of highly skilled "raw talent."** Companies report that Jordanian software graduates are highly intelligent and trainable, compared to international and regional standards. Knowledge of Arabic and English adds to the competitive edge of Jordanians over foreign companies in the region.

- **Use of latest tools and technologies**. Despite their small size and resource base, most IT companies use the latest software engineering and project management tools in their activities.

- **Good relations with major offshore markets**. Links with the US and EU IT industries are strong, given that most IT operators are graduates from schools in those markets.

- **High-quality reputation in regional markets**. Jordanian software houses have a high quality to price reputation in regional markets. As a people, Jordanians are trusted over other nationalities and have an intimate knowledge of local and regional norms.

Overall, our assessment is the industry has considerable potential to develop into a regional center for software and IT services. But it is hampered by several internal factors as noted above, and the overall lack of a clear, shared vision for future development of the industry.

3.3 REGULATORY FRAMEWORK

Overview

The IT sector is also hampered by a plethora of government regulations that erode the competitiveness of the industry, and reduce operating flexibility. While some of these factors affect all private companies in Jordan, many others particularly impact the IT industry. To identify these issues, a detailed analysis of the Jordanian legal and regulatory framework was undertaken. The results of this assessment is presented in Annex A and summarized below.

The Jordanian Government has implemented a number of steps recently in support of the Software and IT Services sector. These include development of intellectual property right laws, exempting many IT hardware items from import duties, and suspending censorship of CDs. But regulatory constraints remain numerous, impeding the development of the industry. Many laws touch upon IT-related issues in many different ways, although not always recognized as such.

Examples include telecommunications laws, broadcasting laws, press and media regulations, national statistics laws, tax laws, import/export regulations, and others. Most of these laws were formulated at a time when the different sectors appeared to be quite independent. The strong convergence of some sectors and the recognition of the underlying common element of information are making it increasingly necessary to reform the set of legislation and regulations to acknowledge and address the new structures and requirements.

Strengths of the Current Regulatory Framework

Several aspects of the existing and legislative framework are positive from the perspective of the IT industry. First is the fact that a competitive Copyright law is already in place that provides the basic protections required of the industry. Combined with the GoJ's intention to join the World Trade Organization (WTO), there is confidence that increased enforcement of intellectual property rights is forthcoming, and that better access to the markets of WTO members will be secured. Second, the Investment Promotion law already covers the software "industry", although full eligibility for fiscal incentives by IT services is unclear, as discussed below. Third, the Customs Department is currently implementing a comprehensive program of reform—including implementation of ASYCUDA—which has the potential to significantly streamline procedures.

Table 3.4: Primary Regulatory Obstacles to the IT Services Industry

Law/Regulations	Impact on Software and IT Services Sector
Labor	Ownership of inventions; use of foreign labor
Income taxation	Tax treatment of IT services sector; depreciation; deductions; treatment of export income from software transmitted electronically
Sales taxes	Effect on IT imports; availability of zero-rating of exports
Investment promotion	Access to incentives; inadequate definition of sector; restrictions on foreign ownership
Industrial Estates/Free Zones	Private ownership and development of a technology park
Telecommunications	Restrictions on private telecommunications networks
Information	Restrictions on exhibition of printed and audible works
Customs	Import procedures; valuation; effective duty rates
Education	Limits on commercialization of research; consulting activities
Procurement	Lack of equal treatment between local and foreign suppliers

Regulatory Barriers to the Software and IT Services Industry

At the same time, our survey of laws and regulations affecting the IT industry identified a number of major barriers (Table 3.4). The most critical of these include the following aspects.

Lack of enforcement of intellectual property rights. Software piracy is a major problem for the industry in Jordan and the Middle East in general. According to the Business Software Alliance of the USA, piracy of packaged software products in the Jordan was some US$1.6 million in 1998[13]. Illegally copied software is pervasive in the Jordanian marketplace. Poor enforcement of existing laws directly reduces income of licensed software developers. It also discourages international IT companies from even considering Jordan as a software development center. It is critical that there is full implementation of intellectual property rights protection in both traditional (paper-based publications, trademarks, patents etc.) and non-traditional information activities (software development, electronic circuitry design, electronic logos, graphical designs etc.), and to enforce these rights gradually, allowing for the established industries to prepare and adjust their operations to the new environment.

Uncompetitive labor and immigration laws. As a "people business," the IT industry is critically dependent on a fair and flexible labor legislative framework. The existing labor law contains several provisions that weaken a firm's ownership of trade secrets. Article 20, for

[13] Business Software Alliance, "1998 Global Software Piracy Report," May 1999. Jordan has one of the highest piracy rates in the world, estimated at 80% of licensed software sales.

example, provides the legal basis for employees to claim ownership of products and services they assisted in developing. The provision of expatriate worker visas is cumbersome and time-consuming. Foreign residents of Gulf countries must obtain visas to travel to Jordan, unlike the treatment in most other countries. While not a deterrent now, expansion of the IT industry may require timely access to *experienced* foreign analysts and project managers in the near future.

Restrictive income taxation provisions. Certain regulations and instructions of the Income Tax law fail to recognize the unique characteristics of the IT industry. Most computer and IT equipment are depreciated at a 15% rate, compared to 20-33% in most countries. This is anti-competitive given the high rates of technological innovation in the industry.[14] Software and IT services are subject to a 25% tax rate, therefore not placed on an equal basis as manufacturing, which is eligible for a 15% income tax rate. There is no clear definition of the industry that encompasses all Software and IT Service activities. Exemptions of income (permitted under the law) from patents and copyrights are unclear. Current provisions exempting export income from taxation are not accessible by many software exporters, mainly because these transactions require an export declaration that is not available to transactions undertaken via the Internet. Deduction of training expenses is only limited to 2%, which is very low given the high training and re-training expenses of the industry.

Cumbersome Customs practices. Given the rapid pace of technological change in the industry, several Customs policies and practices are impediments. While computer hardware and spare parts are subject to a zero tariff, other IT-related equipment that is the "raw material" of the industry is subject to tariffs up to 35%. All items are still subject to a 13% GST which can raise effective tariff rates significantly.[15] These rates are generally higher than in other countries (Table 3.5). The effective duty rate on software imports has been as high as 35%. Classification of certain products for duty purposes is also problematic. Other problems relate to the cumbersome and non-standard procedures of Customs in clearing IT imports. Depending on the product, such imports are subject to the approval of three separate bodies, including the Institute of Standards & Metrology and the Telecommunications Regulatory Commission.

Table 3.5: Import Duties and Taxes on Selected IT Products and Components

	Jordan	Egypt	Israel	India	Ireland
84.71. (Hardware)	13%	15%	17-19%	20%	21%
84.73.30 and 84.73.29 (H/W Spare Parts)	13%	20%	19%	20-40%	21%
85.04.401 (UPS's)	<10 kg = 13%	N/A	N/A	N/A	N/A
85.23.12 (Media)	>10 kg = 48%	15-60%	25-39%	40%	21%
85.28.30 (Data Show & Overhead Projectors)	N/A	N/A	N/A	40%	21%
85.44. (Computer Cables)	48%	15-70%	17-83%	40%	21%
85.24. (Software & Media)	N/A	60%	17-29%	0%	21%

Notes: All figures inclusive of GST/VAT. India and Israel permit imports of IT equipment and products on a duty-free basis for export-oriented software and IT-services activities. On Aug. 1, Jordanian tariffs on many items were dropped to 5%.
Source: AMIR research and estimates.

Lack of access to IPC Incentives and restrictions on foreign investment. Full access to the income tax and other incentives under the Investment Promotion law for the software and IT services industry is limited. The IPC law categorizes software as an industry[16], but omits IT-related services. Access to tax holidays and duty exemptions is not therefore available for these services. A major problem is that a clear definition of the industry that encompasses all software and IT service activities is lacking, even in the amendments to the Investment Promotion law proposed by the IPC. Restrictions on foreign investment are also detrimental in

[14] According to the Income Tax Department, there are internal departmental instructions that can permit doubling of the depreciation rate in certain circumstances. This needs to be standardized and formalized.
[15] On August 1, 1999, the Customs Department dropped tariff rates on a number of items to 5%. However, many important IT components such as modems, PC boards, etc., are not included.
[16] International norms—as set out in the GATS agreement of the WTO—clearly classify software and all computer services as a sub-sector of business and professional services.

various bylaws. "Know-how" is not clearly treated as an intangible right and therefore part of "foreign invested capital." Full foreign ownership is not permitted, and restricted to 50% by regulation. The minimum investment requirement of JD 50,000 for foreign investments is a deterrent to the IT sector, where initial investments tend to be small-scale. Foreigners are also not permitted to practice as commercial agents and middlemen under the Commercial Agents and Middlemen law 20 of 1974. These policies are significantly less competitive than those in most other countries promoting the Software and IT Services industry. (Table 3.6)

Table 3.6: Tax Incentives and Subsidies for the Software Industry—Selected Countries

	Jordan	Egypt	Israel	India	Ireland
Corporate Tax Rate for Software Firms	25%	40%	No special rate	No special rate	No special rate
Income Tax Incentives for Software Companies	-25-75% income & social services tax reduction based on location for software "industry" -Does not fully cover software & IT services)	-5-15 year tax holiday outside free zones -25% investment tax allowance -0 tax on distributed profits	-2-10 year tax holiday in lieu of grants, or -10%-25% tax rate for 10 years -15% withholding tax on dividends -Accelerated depreciation	For STP units: - 5 year tax holiday taken during first 8 years - 100% tax holiday on software exports by STP units	-10% for foreign investment companies -Tax-free dividends for foreign shareholders -Accelerated depreciation
Import duty and indirect tax exemptions	-Duty- and tax-free import of project-related items -New policy to exempt computer equipment	-5% flat rate on start-up import requirements	-None	For STP units: -100% duty-free on software & telecom inputs - No excise duty on local purchases	-None
Other Subsidies	-None	-None	-Grant equivalent to 40% of buildings cost -Grant of 30% of tangible fixed assets -Grant of up to 66% of R&D expenditures	-None	-Employment grants -Fixed asset grants -Grant for full cost of worker & management training -50% of cost of technology acquisition -R&D grant -40 to 60% rent subsidies in certain areas -Loans of up to 50% of export marketing costs -Additional grants for SMEs
Foreign Investment Privileges	-Restricted to maximum 50% FDI participation		100% foreign investment permitted	Automatic approval for up to 100% FDI	100% foreign investment permitted

Source: AMIR research.
Note: Certain incentives are available to all promoted industries, and not specifically the software sector.

Multilateral and Bilateral Trade Agreements

The Jordan-EU Association agreement (Euro-Med Partnership which went into effect this year) contains several restrictions that impede access by the Jordanian software and IT services sector[17]:

- **The Agreement excludes telecommunications services and IT services**. The supply of Jordanian IT services to the EU does not enjoy full markets rights in EU markets. Although both sides will cooperate in science and technology, there exists nowhere in the Agreement that Jordanian IT products and services can be exported to the EU, and if so that they can benefit from the gradual reduction in customs duties according to the prescribed timetable.

- **The Right of Establishment for the sector is not defined**. Jordan needs to negotiate professional and IT services with each European state. Most European states do no allow Jordanian firms to establish presence in their countries just because Jordan has an Association Agreement with the EU.

- **IPR issues remain unresolved**. While Jordan is in the midst of negotiations to join the WTO, and perhaps sign on the TRIPS Agreement, Jordan is required to comply with the all major IPR international conventions under the EU Agreement, (and such commitment(s) are due by or before the end of 2000 or 2001).

With respect to trade protocols and agreements with Arab Countries, Jordan has signed the executive program of the Arab Free Trade Area Agreement (AFTAA). It has also signed the Pan-Arab Agreements on Investment Promotion among Arab Countries and the Movement of Labor. The main issue with these agreements is that they do not explicitly include information technology products and services. Member countries may impose non-tariff, technical barriers to trade. The lack of "detailed" rules of origin makes it difficult for a future Jordanian IT exportable product or service to enter Arab markets. Duty valuation systems are not standardized. These all impede the scope of trade in IT goods and services.

As a professional and business services activity, the Jordanian software and IT services sector will greatly benefit from unfettered access to global markets if it accedes to the WTO framework, particularly the GATS agreement and the optional Information Technology Agreement which exempts import duties on a wide range of IT and computer equipment.

In summary, our assessment is that Jordanian software and IT services firms are operating in a very restrictive regulatory framework compared to most other countries. The industry has not been a priority of the Government, and many laws are not configured for the needs of the industry. Some pose strong deterrents to the development of a vibrant, export-oriented software services industry. New legislation shall also have to be developed to accommodate the major trend in the marketplace toward electronic commerce and internet-based applications.

3.4 Assistance and Support Program

Internationally, governments and the private sector have developed a wide of range of programs to support the development of a competitive, export-oriented IT services industry. These typically include:

- Apex bodies to develop the IT services industry

[17] See Annex A for a full discussion of these issues. These agreements were concluded without consultation with the IT industry.

- Investment promotion and business match-making programs
- Export promotion and trade assistance programs
- Enterprise development through business incubators and other programs
- Specialized venture capital and other IT financial assistance schemes
- Certification programs to enhance the standards of the industry

Many of these organizations and programs exist in Jordan, but are not targeted at, or do not meet the needs of the IT services industry.

Apex Bodies

In Jordan, information technology policy is subsumed under Science and Technology activities of the Higher Council for Science and Technology (HCST). The HCST—through the National Information Centre—has more directly addressed IT policies and strategies. Yet these governmental bodies have not directly supported the development of a vibrant, export-oriented commercial IT services sector. The national information strategy developed by the NIC, for example, deals primarily with the macro issue of IT as a facilitator of good governance and the role of IT in society.[18] There is simply no high-level apex body or mechanism to aggressively promote the commercial development of the sector. This further exacerbated by the lack of a strong industry association for the IT services sector. The role of the JCS has been positive, but focused mainly on issues of relevance to individual software and IT services professionals, rather than the industry as a whole.

Most other countries have established high-level bodies to develop and implement policies and strategies in close cooperation with the private sector. In Israel, these issues are addressed by the Office of the Chief Scientist in each of the major ministries[19] that promotes research and directs funding into high-tech industries, including software and IT services. These activities are directed by Farfait in Ireland, a government agency that develops and implements policies of benefit to the industry. In India, the government established a powerful software industry association (National Association of Software and Service Companies, NASSCOM) that is the apex body for the industry. Egypt has created the Cabinet Information and Decision Support Center (IDSC) to accelerate development of the industry. Singapore has established the National Computer Board.

The lack of a focal point organization to promote the interests of the industry is a significant weakness in Jordan currently.

Investment Promotion

Other countries have also placed a premium on promoting inward investments and collaboration in the IT sector to accelerate growth. Ireland established the National Software Directorate (NSD) within the national investment promotion and economic development agency, the IDA. The NSD is the only EU government body solely addressing all issues in support of the software sector. In India and Israel, investment promotion efforts are led by the respective software associations, in cooperation with government-backed investment promotion agencies.

In contrast, there is no organized effort directed at the industry in Jordan. The Investment Promotion Corporation (IPC) has to date emphasized generation of inward investments in

[18] See, for example: National Information Center, "Jordan's Information Policies and Strategies—Preparing Jordan for the 21st Century," August 1996.
[19] Principally the Ministry of Industry and Trade .

manufacturing, tourism and other activities, but has not targeted foreign investments or collaborations in the IT services area *per se*. The Software and IT Services sector should be a high-priority sector for foreign investment.

Export Promotion

The Jordan Export Development Corporation (JEDCO) is the national export promotion and marketing arm of the Jordanian government. Unfortunately, the track record of JEDCO vis-à-vis the software industry is not promising. JEDCO is spread too thin, and lacks expertise to focus on the sector. There is limited interaction with industry players. In part, this also due to fact that many IT companies have not been responsive to JEDCO's efforts[20]. In our industry survey, none of 23 surveyed companies indicated that they had received any assistance from JEDCO in terms of export marketing and trade support.

Ireland, India and other leading IT locations have emphasized IT export and trade promotion, particularly for SMEs. Enterprise Ireland implements an aggressive and well-funded export marketing assistance program for high-tech companies, including providing grants and loans for export marketing costs. In India, NASSCOM takes the lead in organizing IT trade shows and other export marketing initiatives for their membership. These efforts in Israel are organized by the Israeli Export Institute, business associations such as the Manufacturers Association of Israel and the Israel Association of Software Houses, as well as various Israel-US business associations that facilitate entry of Israeli software and technology companies into the US market.[21]

Enterprise Development

Countries have introduced a variety of mechanisms to stimulate entrepreneurship and business development in the software industry. Israel is among the leading sponsors of technology development incubators specifically directed at the software industry worldwide. There are 26 technology incubators, five of which are specifically oriented at the software and IT services industry. These incubators provide firms with grants of US$150,000 annually for the first two years as well as technical and management support. Half of start-ups have been successful.[22]

Ireland operates a variety of business development schemes aimed at the IT sector through Enterprise Ireland and IDA. Business incubation schemes are operated by the Innovation Centre, as well as a comprehensive "young company" business development scheme.[23] These have been very successful in "incubating" high-tech and software companies, with low failure rates.

Jordan has a much more limited variety of enterprise development and business support schemes, particularly in support of the IT sector. There is only one technology incubator (not limited to the IT sector) in Jordan (Jordan Technology Group, JTG) that provides either financial assistance (an equity stake usually less than 30%) or management and technical assistance to companies that do not require financial assistance. While the program has been relatively successful (13 companies were successfully launched over a period of 10 years), it is under-capitalized and of limited impact in terms of the total needs of the sector.

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[20] JEDCO sponsored three exhibitions at the GITEX and CEBIT conventions. Many IT companies decided not to participate because of the lack of resources (JEDCO offered support for only 50% of attendance and exhibition costs.)

[21] An example of this is the New England-Israel Chamber of Commerce that operates an office park and consulting program in Boston for Israeli companies entering the US market. (Cited in "Sector Assessment of the Egyptian Software Industry," Harvard Computing Group, October 1998.)

[22] Office of the Chief Scientist, Ministry of Industry and Trade, Israel.

[23] The Enterprise Development Programme provides feasibility study grants; equity investments; management and technical assistance; mentoring programs; technology audits; scholarships and research grants; employment creation and training grants; among others.

Financial Assistance

One of the major problems facing Jordanian IT firms, especially those engaged in software and related services, is the lack of access to credit for start-up and working capital needs. As a result, most firms are undercapitalized. Most banks do not understand the knowledge-based industry, given that the tangible assets of most operations are limited. The real asset of these enterprises is human capital and other know-how. Banks are reluctant to lend on a project basis, and have significant collateral and other guarantee requirements. Certain banks may lend up to 40-45% of a signed contract. Specialized instruments to cater to the needs of the industry are lacking; the only venture capital fund available to the high-tech industry is the JTG.[24]

This is a common story in most countries, and IT entrepreneurs have had to look to overseas venture capital funds with more experience with the IT industry. Indian, Israeli and Irish firms, for example, have benefited from funding from US venture capital firms and other overseas partners. Bi-national foundations have also been an important source of funding. A leading example is the Israel-US Binational Industrial Research and Development (BIRD) foundation, which provides 50% of the cost of Israeli-US joint ventures in the high tech industry. BIRD is funded by an endowment of US$120 million—contributed by both governments on an equal basis. To date, over 440 projects have been approved, leading to direct sales of over US$3 billion.[25] Countries have also established a wide variety of grants, subsidies and financial instruments to benefit the IT industry (Table 3.7).

Table 3.7: IT Financing Mechanisms in Selected Countries

	Jordan	Israel	India	Ireland
Government Bank funding	None	None	-IDBI, ICICI, IFCI -State finance banks	None
IT SME Finance	None	-Through technology incubators	-National Small Industries Association	-National Software Directorate
Grants	None	-66% R&D grants -Grants through incubators -Start-up grants -Grants through bi-national foundations (e.g., BIRD)	-Start-up grants through Technology Development Board -Export marketing grants	-Startup grants -Technology grants -Export marketing grants -Employee grants -Training grants -R&D grants
Venture Capital	-JTG -Jordan-US-Israel fund	-Yozma venture capital fund -Local funds -Offshore funds	-12 offshore venture capital funds -State level funds	None

Source: AMIR research and estimates. Harvard Computing Group data.

Standards and Certification

Successfully competing in the global marketplace demands that a software company is able to deliver a product or service that meets customer requirements on a timely basis. Local companies must be able to adapt to international quality standards. To assist in that process, a number of quality management tools and methodologies have been developed internationally.[26] These are generally divided into:

- General Total Quality Management tools, chiefly ISO 9000

[24] A Jordan-Israel-US venture capital fund (TRIDE) has also been established but not been used by industry.
[25] Israeli Association of Software Houses, 1999.
[26] See Annex B for HRD discussion and a detailed description of IT quality certification programs in place internationally.

- IT Association granted quality certifications, such as the Fellow of the Irish Computing Society (ICS) granted by the Irish Computer Society

- Quality certifications granted by independent institutes (the most important being the Software Engineering Institute Capability Maturity Model—SEI-CMM—of the Software Engineering Institute of the US)

- Vendor-Specific certifications provided by Novell, Microsoft, Apple, Oracle and others

Most offshore software and IT service firms internationally have aggressively implemented quality certification programs, with funding assistance from governments and international bodies. In India, for example, some 200 of 400 leading software vendors have attained ISO 9000 and SEI-CMM certification. The Indian software industry will soon have the maximum number of ISO 9000 certified companies in the world.

Software vendors in Jordan are increasingly certifying developers in a variety of vendor-specific certifications (especially Microsoft and Oracle). In fact, Jordan has the highest number of Microsoft Certified Professionals per capita in the world. But there has been little emphasis in total quality certification. None of the companies we surveyed had attained ISO 9000 or SEI-CMM certifications, and only a few had plans for ISO 9000 certification. The JCS has not taken the lead in promoting certification for export competitiveness and to attract foreign investment. It has also not developed a professional certification standard for its membership, due to a lack of resources.

3.5 HUMAN RESOURCES

The most critical factor for the long-term competitiveness in IT is the intrinsic skills, productivity and quality of the workforce. This depends on the quality of the educational infrastructure to deliver a workforce in sufficient numbers and with the skills that industry demands.

Background

The Jordanian work force is among the most educated in the region. Literacy rates average 87.5%, one of the highest in the region, and more than 17% of the labor force has obtained a higher education, with more than 19,000 having obtained post-graduate degrees. Jordan boasts almost 38,687 engineers covering the full range of disciplines and more Ph.D. graduates per year than Israel. Jordan's skill base continues to both deepen and widen, providing the economy with skills that had once been in short supply. In recent years, the return of Jordanian expatriate workers from the Gulf has further augmented Jordan's skills base, but many professionals have since left. As a result, Jordan has become a major supplier of brainpower throughout the MENA region.

Jordan has a labor force of 960,000 and a Government-estimated unemployment rate of 15.2 %; other estimates place the figure as high as 30-40%. Unemployment rates are much higher for skilled labor categories; those with a non-technical educational background; and women. While more Jordanian unskilled and semi-skilled workers are taking jobs that have traditionally been occupied by non-Jordanians, there is increasing demand for low-skill and menial jobs that Jordanians do not take. The mismatch between skills produced by the educational infrastructure and the needs of industry is a central characteristic of the labor market.

The educational sector in Jordan provides governmental and private teaching services, with the government operating 2,750 schools and the private sector 1,419 schools, as well as 238 schools operated by other authorities. The Kingdom has 20 Universities with an undergraduate student body of 83,506 and a postgraduate student body of 1,787. In addition, more than 22,500 Jordanian students are completing their higher education abroad.

There is an abundance of highly qualified labor in the engineering, computer and management fields. Eleven universities in Jordan offer degrees in different engineering fields. There are also 17 Universities offering degrees in Computer Science, Computer Engineering and Telecommunications. In addition to university graduates, community colleges also contribute to mid-level educated labor in similar fields. Vocational training and intermediate level education is offered in Jordan through intermediate colleges and vocational training institutes. These colleges are owned by the Ministry of Higher Education, other Governmental Departments, U.N.R.W.A., and the Private Sector. The student population in the IT fields number 8,000 at university level and 5,300 at two-year community colleges. Over 2,300 students graduate each year and are added to the IT labor market.

Main Strengths

From the perspective of the IT industry, Jordan has three main strengths: the low wage rates of IT workers, the relatively large supply of IT graduates, and the strong theoretical background of graduates.

Wage rates for IT workers are among the lowest internationally (Table 3.9). The direct salary of a starting-level Jordanian programmer is US$12/day, far below the US$113-US$180/day wages paid for equivalent Irish and Israeli workers, and a fraction of US levels.

Table 3.9: Average Salaries of IT Professionals—Selected Countries (US$)

	Jordan	Egypt	Israel	USA	India	Ireland
Starting Level Programmer ($/day)	$12	$12	$113-$180	$134.62-$173.10	$6.10-$15.50	$113.60-$136.40
Starting Level Technical Writer ($/day)	$16	$14	$113-$180	$134.62-$173.10	$6.10-$15.50	$113.60-$164.80
Starting Level Project Manager ($/day)	$27	$20-$40	$205-$227	$241.35-$301.92	$20.21-$30.30	$132.60-$225.40
Starting Level Systems Analyst ($/day)	$20	N/A	$110-$190	$212.50-$288.46	$18.20-$45.45	$92.80-$172.40
General Manager of Software Development Firm ($/month)	$2,000	N/A	$5,000-$8,000	$6,250-$7,917	$670-$1,200	$3,334-$5,834
Average Fringe Benefits Ratio	38%	35%	32%	25%	20-35%	40%
Labor Turnover (per year)	30%-40%	N/A	N/A	15%	17.2%	10%

Notes: Wage figures are direct salaries, exclusive of fringe benefits; not "charge out" rates. Data is as of 1999.
Source: AMIR research and industry estimates.

Even more importantly, Jordanian IT wages are roughly at the same level as Egypt's and below the higher end of the Indian IT wage scale. The much-known Indian wage advantage in the IT industry is gradually reducing as shortages of programmers, project managers and other IT workers have begun to be felt by the industry. Wage rates and benefit packages are increasing rapidly in certain segments of the industry. In short, our data indicates that Jordanian IT companies can compete on a labor cost basis with most offshore locations. Of course, total cost competitiveness of a software vendor depends on the overall efficiency of a software company that is a result of many factors. Jordanian software companies appear to be cost competitive even on this basis. For offshore programming jobs, for example, Jordanian companies are

Table 3.10: Annual Graduates of IT-Related Subjects

	Jordan	Egypt	Ireland
2-year Technical Colleges	1,229	2,600	900
BS Programs	1,000	1,150	1,240
MS Programs	78	875	760
Total Number of Graduates	2,307	4,625	2,900

Notes: Irish data is for 1996.

"charging out" programmers at US$20-25/hour, compared to US$15-$38/hour for Indian programmers, and US$65-$70/hour for US programmers.

The overall supply of students enrolled in IT-related subjects in Jordan is also a significant advantage (Table 3.10). Over 2,300 students in computer science and related fields graduate each year, comparable to levels in Ireland and Egypt. These levels are set to increase in the coming years, given that over 8,000 students are enrolled in various universities and colleges in the IT area. Unlike most countries, Jordan has an excess capacity that can be strategically used to attract and build an IT services industry.

Jordanian IT labor supply levels are of course far below the annual output levels of large countries like India. More than 67,000 graduates (with varying degrees of IT skills) enter the workforce each year in India.[27] But annual demand for software professionals from existing software houses is forecast at 55,000 per annum for the next few years by NASSCOM. Therefore, the supply of labor is very tight for the Indian IT industry in the short-term.

Main Weaknesses

Despite these inherent strengths, there are several factors that erode Jordan's IT human capital advantage. Some of these relate to the productivity of workers, others are a result of deficiencies in the overall educational infrastructure.

Table 3.11: Universities Do Not Respond to IT Industry Needs

Skills requested by IT companies	Available at Amman University	Available at Princess Sumaya University
Project Management	Yes	Yes
Internet Development – HTML	Some	Some
Internet Development – Java	**No**	**No**
Programming – Visual Basic	Yes	Yes
Programming – C++	Yes	Yes
E-Commerce and Web Applications Design	**No**	**No**
Multi-media Design and Application Integration	**No**	**No**
Internet Standards and Protocols (TCP/IP…)	Some	Some
LAN Administration – UNIX, Linux, and WinNT	Some	Some
Database Developer/Administrator (SQL, Oracle, SAP, etc.)	Some	Some
LAN, WAN, Internetworking Integration (Servers, Clients, Ethernet, Hubs, Bridges, Routers)	**No**	**No**
PC Hardware and Support Services	**No**	**No**

Source: AMIR research.

Computer science education at Jordanian universities does not meet the needs of industry. The computer science curriculums of Jordanian universities have a traditional focus on theory and conceptual understanding, not linked to the needs of the marketplace. Programming languages, for example, focus on outdated languages like COBOL and FORTRAN, rather than Visual Basic and C++. As summarized in Table 3.11, students do not have exposure to Project Management, Technical Writing, Graphics, Internet Development, Web Applications, and numerous skill areas demanded by industry. The lack of skills puts a major burden on IT firms in terms of in-house training. Changing curriculums is difficult given central control by the Ministry of Education.

Limited interaction between universities and the IT industry. There is virtually no interaction between universities and business[28] in general, unlike the dynamic industry-university linkages established in other countries. There are few programs to support faculty development and professional enhancement. Computer Science departments in most universities are deeply reluctant to enter into partnerships with the IT industry as these could damage the academic integrity of programs. Paralleling the lack of connection with the local

[27] NASSCOM, India.

[28] One World Software is sponsoring research activities at a Jordanian university. Certain companies offer internship programs for IT students.

IT industry, there are few relationships with global software and hardware companies.[29] In contrast, various partnership approaches have been used to facilitate skill development and applied research in relevant IT areas in many other countries. In Israel, for example, 9% of all university research is funded by industry.[30]

Limits on the commercialization of research. Jordanian universities practices generally restrict the activities of departments and professors to commercialize their applied research. Ph.D. holders are not permitted to work outside universities. This is in sharp contrast to countries like Israel and the US that actively promote commercialization activities. Each university in Israel has established technology transfer companies to manage the commercial aspects of their research and promote products developed by their products.[31] The revenues of these companies goes to the universities and therefore ensured the marketability of applied research.

Absence of specialized institutes in the IT area. Jordan currently lacks a university- or corporate-sponsored "center of excellence" in software processing or engineering. Other countries have established these institutes as a way to jump-start training in relevant IT skill areas and to serve as a model for reform of traditional IT education in universities (Box). Increasingly, multinational software companies are searching for offshore locations to develop talent for their operations. These corporate schools in IT education, training and research are prominent especially in India, in collaboration with the government-run Indian Institute of Information Technology system.

Examples of IT Centers of Excellence

- Nebraska Applied Information Management Institute (US)
- IBM School of Enterprise-Wide Computing (India)
- Oracle School of Advanced Software Technology (India)
- Centre for Software Engineering (Ireland)
- Cisco Systems Resource Center (Israel)
- National Center for Software Technology, (India)

Limited computer resources and awareness at all aspects of educational system. The lack of resources is a central feature of the Jordanian educational system, from primary to graduate education. Computer departments in universities and technical colleges are reliant on outdated computer technology and other resources. The higher education system has only four computers available for every 100 students. Primary education suffers from a very limited access to computers. While 90% of the country's private K-12 schools have access to computers, only 25% of government-run schools are computer-enabled. Nationwide statistics indicate a ratio of only two computers available per 100 students. The lack of resources is an important factor behind the general limited awareness and literacy in the country.

Other drawbacks in terms of human resources relate to the productivity and behavior of IT workers in the workplace (detailed earlier in this section). The lack of usable skills puts a burden on software houses to re-train entry-level staff in-house. Critically needed skills—outside the programming arena—are unavailable. Most students are not interested in marketing, management, technical writing and other areas that are not regarded as central parts of "computer science." There is a lack of native English language skills. A major problem facing the industry is the "brain drain" of experienced IT professionals to the Gulf, Europe and the United States; the lack of ESOPs, which could help retain staff, is a contributing factor. Turnover rates, as a result, are much higher than in other countries, 30% relative to 10-15% elsewhere. Many professionals leave to start other companies, in part because they can legally take proprietary technologies and processes with them. Employers complain about the lack of company loyalty and a poor work ethic. In part, this the result of poor management techniques, as well as the lack of funding in most IT firms to invest in leading management and operational technologies.

[29] An emerging example of this in Jordan is the tie-up between Cisco Systems and JUST.
[30] Harvard Computing Group.
[31] Harvard Computing Group.

3.6 INFRASTRUCTURE AND PHYSICAL FACILITIES

Telecommunications

In addition to good human capital, a major factor affecting the competitiveness of the IT industry is access to high-speed data communication services, at international price and quality levels. The globalization of the information technology industry is putting pressure on IT companies to maintain high-speed Internet access. Within two years, software products will mostly be available to end-users via the Internet, and not sold in packages. Jordanian software companies will need to have low cost, high-speed access to the Internet to download and upload programs. This will require increased bandwidth and low prices.

The existing data telecommunications services network in Jordan is far from meeting the near-term needs of the IT industry (Table 3.12). Unlimited Internet access at low-speed rates is US$111/month (JD78), compared to US$17/month in Ireland; US$35/month in Israel; and US$19.95-$20/month in the U.S. In the UK, some ISPs are providing free Internet access, a trend that is likely to spread to other countries. Higher rates in Jordan are the result of high costs imposed on ISPs; the cost of local calls is also high.

Table 3.12: Cost of Internet and High Speed Data Telecommunication Services (US$)

	Jordan	Israel	India
Dial-Up Internet:			
Cost of 28.8 kbps/month Dial-Up Connection (unlimited use)	$111/month	$35.00/month	$190/month for 500 hours
Dedicated (7/24) Lines:			
Monthly Lease Rate of Dedicated High-Speed Lines	$1,700/64kbps	$200/64kbps	$440/64 kbps
	$3,400/128kbps	$350/128/kbps	$880/128 kbps
	$6,800/256kbps	$450/256kbps	$1,500/256 kbps
	$27,000/1.5mbps	$1,800/1.5mbps	$3,000/1.5/mbps

Note: Lease rates are exclusive of installation fees and all other charges. For international circuits in Jordan, users pay for an uplink connection through the JTC and a downlink connection from an international carrier. Rates are exclusive of charges paid to international carriers, which are high (about $4,000-$5,000/64kbps circuit). A T1 (1.5mbps) circuit would require an additional $12,000 for the international carrier, resulting in a total cost to the Jordanian end-user of $39,000.
Source: AMIR research.

The real cost disadvantage is with dedicated (7 days a week, 24 hours per day) high-speed lines. Currently, the state-owned Jordan Telecommunications Corporation (JTC) charges US$1,700/month for a 64 kbps line; a very high speed T1 line is available at an exorbitant rate of US$27,000/month. In other offshore software locations like Ireland, Jamaica, Israel and elsewhere, T1 lines are available at US$1,500-$2,000/month through commercial satellite providers such as PanAm Sat, American Satellite Company, and others.

The main reason for this huge cost differential is monopoly pricing on the part of the JTC, and the lack of capacity in the system. By law, the JTC has a monopoly on all telecommunications services until 2003. Like all international PTTs, the JTC leases circuits from INTELSAT and commercial satellite and cable service providers, at wholesale rates of US$900-$1,000/Half T1/month. JTC allows private companies to use their own facilities and networks to downlink data (for a hefty JD 3,000 license fee) given that Jordan is a net importer of data, and therefore requires a much larger bandwidth for receiving rather than transmitted data. However, uplinked information must go through the JTC system. Moreover, JTC threatens ISPs by entering into unfair competition in the near future, which might have a positive impact on

prices, but will likely have an adverse impact on service. While the much-anticipated FLAG project will provide Jordan with a very-high speed, fiber optic network link and increase total bandwidth available—the retail pricing structure will not be affected *per se*.

The decision to lower rates of high-speed telecommunications and other value-added telecommunications services lies solely with the JTC. Prospects for doing so in the near-term are not promising. There are concerns that such actions may hinder opportunities for the partial privatization of the JTC now underway.

It is important to point out that these issues do not fundamentally affect most existing IT firms in Jordan currently. Most firms do not have high data communication requirements. Only a handful of companies lease dedicated lines, most continue to rely on dial-up connections to the Internet at low speeds of 28.8 to 33.6 kbps. Their major concern is the relatively high cost of such services, poor quality connections and limited capacity of the system available to ISPs.

However, international experience shows that demand for high-speed, value-added telecommunications will grow exponentially as software firms target global market opportunities.

Physical Facilities

As a "people business" IT firms need to have conducive work environments. Recognizing this need, over 60 countries have established over 250 technology parks worldwide, many of which cater specifically to the software industry (see Box). While these parks share common elements, they differ in terms of:

- **Objectives**—to promote R&D versus an investment and job creation catalyst.
- **Size**—ranging from a single building (urban parks) to over 3,000 hectares (science towns or technopoles).
- **Ownership**—the most common being universities (e.g. Stanford Research Park, US); private sector (Kyoto Science Park, Japan); or private foundations (Research Triangle Park).
- **Occupants**—ranging from government R&D labs, to technology incubators, manufacturers, regional headquarter companies.
- **Links to universities**—many parks are located next to universities or have strong linkages with research institutions.
- **Incentives**—some countries like India have comprehensive set of incentives for companies locating in software and electronics technology parks.

Technology Parks

Typical Facilities

- Research and testing lab
- Intelligent buildings
- On-site teleport earth station
- Technology incubator/center
- Wide Area Network
- Recreational facilities
- Shared business services
- Training and consultancy center
- Exhibition areas

Some Examples

Software and IT Services
- Techopark Kerala, India
- Software Technology Park, Brazil
- InfoPark Budapest, Hungary
- Multimedia Super Corridor, Malaysia

Incubation
- Tefen Industrial Park, Israel
- Rensselaer Polytechnic Park, USA
- Massachusetts Biotechnology Park, USA

Research and Development
- NSTDA Science Park, Thailand
- Taedok Science Town, South Korea
- Cambridge Research Park, UK

High-Tech Manufacturing
- Hsin-chu Science Park, Taiwan
- Shenzen High-Tech Park, China
- Singapore Science Park, Singapore

- **Facilities**—parks oriented to R&D typically house elaborate government-funded labs; parks oriented towards the IT industry have specialized telecommunications networks, smart buildings, etc.

- **Layout and Services**—parks are highly landscaped, with attractive "office park" work environments; tenants share recreational facilities and business and technology services.

The world leader in terms of **software oriented technology parks** (STPs) is India. There are currently some 12 STPs in the country, accommodating the majority of export-oriented software and IT services firms, and accounting for almost 70% of IT export revenues.[32]

Our analysis shows that there is very little demand for a purpose-built software technology park in Jordan now. Existing software houses have invested in existing facilities and are reluctant to relocate, especially to a location far away from the center of Amman. However, international experience indicates that demand for an attractive, purpose-built facility will grow as the industry expands over the next 3-5 years and foreign investment increases. A technology park could have a number of important benefits to the Jordanian IT industry:

- Foster cooperation among IT companies in marketing, research and development, allowing them to reach a larger scale

- Increase the productivity of their workers through better facilities and recreational, social and other facilities

- Reduce start-up and operating costs through provision of shared services and facilities, especially in terms of dedicated, high-speed telecommunications

- Facilitate entrepreneurship, technology, on-going education and business development through on-site incubators and training centers

- Serve as a focal point to attract foreign investment in the industry

3.7 Conclusion -- Jordan's Overall Strengths and Weaknesses in IT

Based on the information presented in the previous section and the data in the Annexes, Jordan's software and IT services sector has a number of important strengths and weaknesses. Jordan's principal advantages with respect to the IT industry include:

- **Analytical skills**. The fundamentals of the computer programming staff - The strong emphasis on analytical skills in education allows for adaptability for a wide range of applications.

- **Low cost labor**. At an average of US$ 640 per month, it rivals rates from leading Indian software developers (considered highly cost competitive) and is at least one-sixth the rate of neighboring Israel. This advantage is however also shared by Egypt, an emerging growing supplier of software programming skills in the Middle East.

[32] NASSCOM, India.

Table 3.13: Summary of Jordan's IT Strengths and Weaknesses

	Strengths	Weaknesses
IT Firms' Capabilities	-Availability of good "raw talent" -Use of latest software development tools -Good relations with offshore markets -High quality reputation -Time zone advantages relative to US, EU	-Small size, fragmented, small scale -Limited capitalization -Limited foreign collaborations -Lack of access to critical skills -Lack of use of leading operations tools
Regulatory Framework	-Competitive Copyright law in place -IPC incentives for software "industry" -Customs procedures being streamlined -Limited enforcement of censorship controls	-Lack of IPR enforcement -Uncompetitive labor regulations -Import/export procedures still cumbersome -Censorship provisions in laws -IT services do not benefit from IPC incentives -Foreign investment limits in services -Restrictive access to high-speed telecoms -Limited support from Government -Exclusion of IT products from bilateral and multilateral trade agreements
Assistance and Support Programs	-Moderate export promotion program in place -Investment promotion program in place	-Higher Council for S&T and RSS/NIC not focused on commercial activity -Weak IT sector association -JEDCO lacks resources, not connected to IT industry -IPC does not target IT sector -Lack of incubators and assistance programs -Lack of venture capital & finance mechanisms -Lack of quality certification
Human Resources	-Good quality IT raw talent -Low wage IT labor -Relatively large supply of IT labor	-Computer science education unconnected to industry needs -Limited interaction between education sector and industry -Limits on commercialization of university activities -Absence of specialized IT institutes -Limited computer resources and awareness at all levels of educational -Brain drain of IT professionals -Poor work ethic/company loyalty
Infrastructure and Physical Facilities	-Adequate access to low-speed data communication services for present needs -Adequate office facilities and business support services for established IT firms	-Very high cost of high-speed data telecommunication services -Limited capacity and poor quality of lines for internet access -Physical facilities not adequate to meet expansion of IT services industry

- **Excess supply of IT Labor**. Unlike most countries, a relatively large number of IT students are enrolled in the educational system that cannot be absorbed by industry. The education system in Jordan places strong emphasis on analytical skills. Thus, the pool in this sector has skills that are widely adaptable to a range of applications.

- **Good firm capabilities**. IT firms compete based on a high-quality reputation and good "raw" talent in their workforce. Jordan has important time zone advantages and good relations with major markets

Jordan's principal disadvantages are:

- **The small size of the domestic market** which does not allow for extensive exposure to new project applications; the changing nature of technology requires technical labor to stay abreast with new technologies in context of their applications. There is a lack of appreciation of software and IT services in the domestic market.

- **Fragmented IT industry**, characterized by undercapitalized firms and lack of collaboration in marketing, skills development, service delivery, etc. Most firms lack the scale necessary to penetrate the global market on a sustained basis. Lack of standardized processes, methodologies and certification practices are also drawbacks.

- **Brain drain and high labor turnover rates**. Experienced IT professionals leave for higher paying jobs overseas resulting in labor turnover rates higher than many locations.

- **Lack of critical skills**. IT graduates lack critical skills and experience demanded by industry. Lack of native English language skills puts Jordan at a competitive disadvantage with most IT locations.

- **Weaknesses in the IT educational infrastructure**. University computer science curricula do not meet industry needs. Partnerships between both sectors are lacking.

- **Weak Government support to the IT sector**. Existing promotional bodies are largely unconnected to the IT industry. The Government has not raised IT as a mechanism to enhance public sector efficiency to serve as a stimulus to the domestic software and IT services sector. Specific financial and other assistance programs are lacking.

- **Uncompetitive regulatory framework**. The lack of enforcement of Copyright laws, weaknesses in the labor and taxation laws, restrictive telecommunications policies—all hinder the scope of the sector. A greater problem is the poor and unpredictable implementation of regulations.

- **High cost data telecommunications links.** JTC rates for high-speed data lines and services are very high by world standards. Existing capacity is limited.

Our overall conclusion is that the key advantage of Jordan lies in its human capital. All the obstacles listed above could be gradually addressed to exploit this significant competitive advantage.

Chapter 4

STRATEGY AND ACTION PLAN

The previous discussions outlined the significant opportunities for Jordan's Software and Information Technology Services industry, and analyzed the sector's competitive position relative to regional and international competitors. The main finding was that Jordan can compete. It has excellent potential to develop into a small but significant market player in the industry; even a small percentage of a US$400 billion global industry would be extremely significant for Jordan. This chapter presents the overall strategy and a concrete action plan for making Jordan a regional leader in software development and information technology services.

The strategic plan outlined below consists of the following components:

A **Vision** for development of the sector

An **Overall Goal** for development of the industry and quantitative targets

Major **Strategic Thrusts** of the plan to achieve the Overall Goal and Vision

An **Action Plan**, including specific objectives, actions, timelines and delineated responsibilities within each of the Strategic Thrusts

The strategic plan draws upon our analysis of Jordan's competitive position and the successful efforts of other offshore software locations. Most importantly, it centers around ideas and recommendations produced by key IT industry leaders—experts with intimate knowledge and experience—who will utlimately lead Jordan's thrust into the knowledge-based economy of the future.

4.1 JORDAN'S IT SERVICES VISION

The Vision for the Software and IT Services industry is to become a regional leader and internationally recognized exporter of IT products and services. Two aspects of the underlying philosophy of the Vision (see Box at right) are at its core:

Private sector leadership. By adopting this philosophy, Jordan will not only achieve success, but will distinguish itself from most other countries of the region that continue to embrace ineffective Government-dominated approaches.

Partnership with the Government. Active support of the GoJ to create a positive regulatory framework and actively support the IT industry is essential.

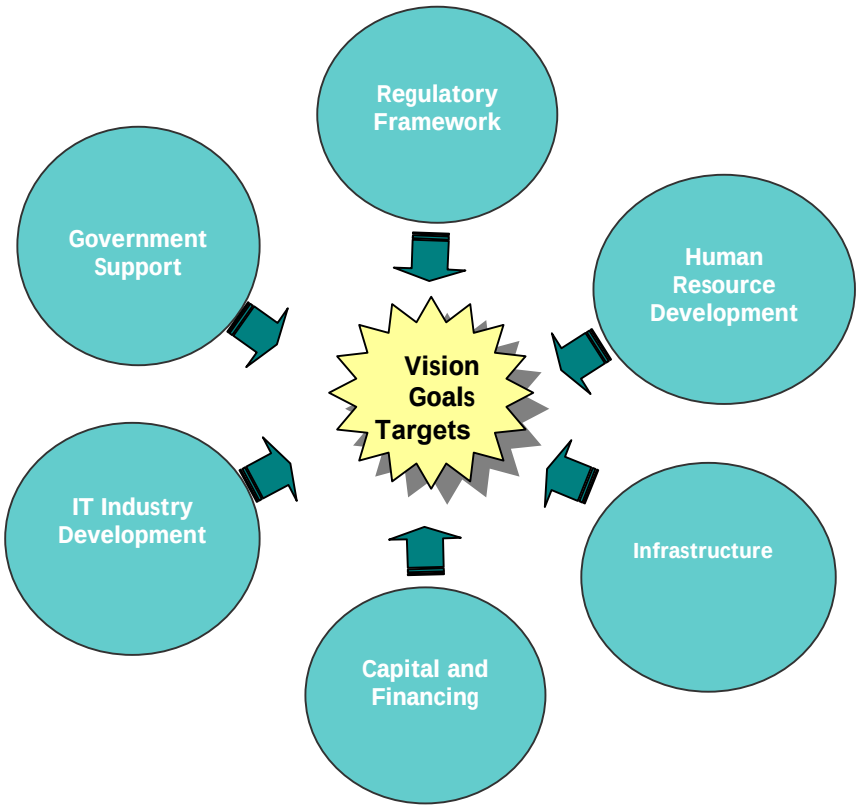
Jordan's Software and IT Services Vision

Jordan shall become a regional IT leader and internationally recognized exporter of IT products & services, exploiting its core human capital advantages.

The key to success is the leadership and central role of the private sector, which shall spearhead the sustained entry of the sector into international markets.

It shall also require strong and active support from all levels of Jordan's Government to create a positive regulatory and promotional environment for IT success now and into the future. This IT industry-Government of Jordan partnership is the key to sustained growth and creation of economic benefits for all Jordanians.

Figure 4.1: Jordan's Software and IT Services Development Strategy



4.2 OVERALL GOALS AND TARGETS

The overall goals build upon the vision statement. First and foremost is the goal of developing an **internationally competitive IT industry** in Jordan—one that attracts both **foreign and local investment**, generates **high-value jobs**, and produces substantial levels of **exports** in the near to medium term. Secondly, the strategy's implementation will facilitate **modernization** of both the Government and the private sector, ensuring usage of up-to-date information technologies and empowering businesses and citizens to realize their full potential. Finally, the long-term goal is to **position Jordan favorably** within the knowledge-based economy of the future. The country must stake out a leadership position in the region and in the world at large.

Based upon our assessment, specific targets underlying these goals include:

- **30,000 IT-related jobs by 2004**. Based on employment levels and growth rates in other successful countries, achieving this objective is realistic and should be a key economic goal.

- **US$550 million in annual exports by 2004**. This should be feasible given current growth rates of over 100%/year for IT exports from Jordan.

- **US$150 million in cumulative Foreign Direct Investment by 2004**. Within 5 years, this target is entirely reasonable, especially considering recent investments in countries such as Egypt (e.g., US$10 million single investment by Lucent Technologies) and other countries (US$45 million Technical Assistance Center by Cisco Systems in Australia. If Jordan succeeds in attracting major players to IT service, production, and venture capital opportunities, this figure could be reached in 3 years or less.

4.3 STRATEGY OVERVIEW

Strategic Thrusts

Achieving these goals and economic targets will require the sustained implementation of a range of actions in a number of inter-related areas. Our plan consists of focused and time-bound actions within six **strategic thrusts**:

1. **IT Industry Development**. The capabilities of existing IT services firms and the sector as a whole need to be upgraded to effectively compete in regional and global markets.

2. **Policy and Regulatory Strengthening**. Success will require the establishment of a supportive regulatory framework for the IT industry, and streamlining of procedures.

3. **Human Resource Development**. Long-term competitiveness depends on the ability of Jordan's educational initiatives to produce the quality and quantity of IT professionals that meet the requirements of the marketplace.

4. **Government Support**. Total commitment and active Government leadership is required to stimulate, facilitate and promote the software and IT services sector.

5. **Capital and Financing**. Innovative mechanisms are required to provide funding to the industry and facilitate Initial Public Offerings (IPOs) of successful companies.

6. **Infrastructure Improvement**. Development of telecommunications and purpose-built physical facilities to increase the competitiveness of the IT industry, and the productivity of Jordanian IT workers.

Recognition of the potential for the IT services industry to become one of Jordan's leading export winners—rivaling traditional mining and tourism exports—is important. But pro-active implementation of concrete actions in each of these strategic thrust areas is critical to success. This will require integrated actions undertaken by the IT Industry itself and the Government of Jordan. These are briefly summarized below and detailed in the following section.

Role of the IT Industry

The strategy will succeed only if it is led and directed by the private sector. Industry leaders must continuously fine-tune strategies and actions to support the industry, and monitor the effectiveness of the actions implemented. In addition to this overall leadership role, the private sector should take the lead in the following:

- **Innovative approaches to manpower development**. The IT industry can foster closer ties to the educational system, including funding and technical direction, to upgrade the quality and quantity of IT manpower.

- **Active support in marketing and financing**. The IT industry can collaborate to jointly undertake export marketing and investment promotion initiatives, in partnership with JEDCO, IPC and others. It can develop innovative funding approaches.

- **Upgrading industry capabilities**. The industry can spearhead initiatives to create and implement quality certification systems to world standards. Companies can collaborate to develop the necessary scale and capability to penetrate service global markets.

- **Infrastructure provision**. The private sector can provide value-added data telecommunications services and develop purpose-built facilities to meet industry requirements.

As detailed below, exploiting this potential shall require the development of a more effective IT industry association that can spearhead these initiatives. The unique and successful collaboration of industry players in the context of the REACH initiative can be deepened and formalized to provide continuity of these efforts.

Role of Government

Active and sustained support of the Government is also a key prerequisite for success. None of the other leading offshore software locations such as India, Ireland, and Israel would have succeeded without this role. The major actions of Government include the following:

- **Development of a positive regulatory framework for the IT industry**. This includes streamlining of procedures, better enforcement of existing laws, modifying certain provisions of existing laws and regulations, and the development of new legislation (**E-commerce**) that is crucial for the long-term competitiveness of the industry.

- **Direct support and stimulus to the IT industry**. Prioritizing development of the sector one of Jordan's priority industry is important. Spearheading a comprehensive "**E-Government**" initiative shall stimulate IT services and the educational sector. Focused assistance and more innovative approaches to provide capital and marketing assistance to the industry is critical.

- **High-level mechanism for support to the IT Industry**. The Government should create a mechanism in partnership with the IT industry to ensure that positive intentions and pronouncements are translated to concrete actions "on the ground."

Throughout the world, IT initiatives have succeeded because they were led by the private sector, but had high-level support and positive actions of Government. This partnership is the keystone of the REACH initiative.

Other Stakeholders

Success of the initiative will require support from a wide range of other stakeholders. These include foreign software and hardware vendors, training and technical insitutes, universities and colleges. It will be necessary to involve banks (as customers, providers of debt financing to IT companies, and issuers of credit cards to facilitate e-commerce), insurance companies, hospitals, among others. Technical and financial support of international donors will also be important.

4.4 ACTION PLAN

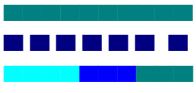
This section presents the proposed Action Plan, comprised of specific objectives and actions in each of the core areas. Table 4.1 provides an overall summary of the major proposed actions, and identifies the key roles of the IT Industry, Government and other stakeholders. Table 4.2 displays the time line for the proposed actions. Table 4.3 presents the organizational responsibility for the implementation of the proposed actions. Following these tables are more detailed descriptions of all actions within the six main thrusts of the strategy.

Table 4.1: Summary of Proposed Action Plan

Actions	IT Industry Role	GoJ Role	Role of Other Stakeholders
IT Industry Development			
1. Establish new IT Industry Association	X		X
2. Promote joint collaborations among IT companies	X		
3. Improve capabilities of Jordanian IT companies	X		X
4. Develop Employee Stock Ownership Plans for IT firms	X	X	X
5. Develop software quality certification programs	X		X
Regulatory Framework Strengthening			
1. Reduce indirect tax burden on all IT related products		X	
2. Streamline Customs procedures		X	
3. Enforce intellectual property rights, especially Copyrights		X	
4. Amend restrictive provisions of Labor law		X	
5. Continue policy of no censorship of IT products		X	
6. Adopt more competitive taxation policies		X	X
7. Enhance access to IPC incentives		X	X
8. Remove constraints to ESOPs		X	
9. Sign the Information Technology Agreement and IT customs valuation accord of WTO	X	X	X
10. Develop Electronic Commerce legislation			
Human Resource Development			
1. Initiate program by IT industry to benefit IT students	X		X
2. Work with universities to focus on critical skills	X		X
3. Strengthen IT industry-universities ties	X	X	X
4. Promote collaborations with overseas universities	X		X
5. Establish a Center of Excellence-styled training institute for software industry	X	X	X
Government Support			
1. Establish private-public Council for IT Services Industry	X	X	
2. Initiate E-Government program and adopt national IT projects	X	X	X
3. Focus export and investment promotion efforts on industry	X	X	X
4. Develop and implement IT incubator program	X	X	X
Capital and Financing			
1. Develop/attract IT venture capital funds	X	X	X
2. Make funding available at preferential terms		X	
3. Facilitate IT IPOs on the Amman Stock Exchange	X	X	X
Infrastructure Development			
1. Provide preferential access to high-speed lines and permit private up-links and downlinks		X	
2. Provide competitive pricing on high-speed lines		X	
3. Initiate private sector-led Information Technology Park	X	X	X

Table 4.2: Timeline for Proposed Action Plan

Actions	Year 1	Year 2	Year 3
IT Industry Development			
1. Establish new IT Industry Association 2. Promote joint collaborations among IT companies 3. Improve capabilities of Jordanian IT companies 4. Develop Employee Stock Ownership Plans for IT firms 5. Develop software quality certification programs			
Regulatory Framework Strengthening			
1. Reduce indirect tax burden on all IT related products 2. Streamline Customs procedures 3. Enforce intellectual property rights, especially Copyrights 4. Amend restrictive provisions of Labor law 5. Continue policy of no censorship of IT products 6. Adopt more competitive taxation policies 7. Enhance access to IPC incentives 8. Remove constraints to ESOPs 9. Sign relevant Agreement and Accords of WTO 10. Develop Electronic Commerce legislation			
Human Resource Development			
1. Initiate program by IT industry to benefit IT students 2. Work with universities to focus on critical skills 3. Strengthen IT industry-universities ties 4. Promote collaborations with overseas universities 5. Establish a Center of Excellence-styled training institute			
Government Support			
1. Establish private-public Council for IT Services Industry 2. Initiate E-Government program/adopt national IT projects 3. Focus export and investment promotion efforts on IT 4. Develop and implement IT incubator program			
Capital and Financing			
1. Develop/attract IT venture capital funds 2. Make funding available at preferential terms 3. Facilitate IT IPOs on the Amman Stock Exchange			
Infrastructure Development			
1. Provide preferential access to high-speed lines and permit private up-links and downlinks 2. Provide competitive pricing on high-speed lines 3. Initiate private sector-led Information Technology Park			



Continuous Implementation
Implementation on an on-going basis
Staged implementation in 3 years (i.e., plan/design/develop)

Table 4.3: Organizational Responsibility for Implementation of Proposed Action Plan

Actions	IT Industry	GoJ Ministries and Agencies	Donors/ NGOs/ Universities/ Private Banks
IT Industry Development			
1. Establish new IT Industry Association	**Leaders /JCS**		**Donors**
2. Promote joint collaborations among IT companies	**Leaders / JCS**		
3. Improve capabilities of Jordanian IT companies	**Leaders / JCS**		**JUSBP**
4. Develop Employee Stock Ownership Plans for IT firms	**JCS**		**Donors**
5. Develop software quality certification programs	**JCS**		**Donors**
Regulatory Framework Strengthening			
1. Reduce indirect tax burden on all IT related products	**IT Industry**	**MOF**	
2. Streamline Customs procedures		**MOF**	
3. Enforce intellectual property rights, especially Copyrights		**MIT** **MOL/MOI/MIT**	**Donors**
4. Amend restrictive provisions of Labor law		**MOF**	
5. Continue policy of no censorship of IT products		**MOF/Council**	
6. Adopt more competitive taxation policies	**IT Industry**	**MIT/Council**	**Donors**
7. Enhance access to IPC incentives	**IT Industry**	**MOF/MOP**	**Donors**
8. Remove constraints to ESOPs		**MIT/Council**	
9. Sign relevant Agreements and accords of WTO	**IT Industry**	**MIT**	**Donors**
10. Develop Electronic Commerce legislation			
Human Resource Development			
1. Initiate program by IT industry to benefit IT students	**Leaders/JCS**		
2. Work with universities to focus on critical skills	**Leaders/JCS**		**Donors/Univ**
3. Strengthen IT industry-universities ties	**Leaders/JCS**	**MOE**	**Donors/Univ.**
4. Promote collaborations with overseas universities	**Leaders/JCS**		**Donors/Univ.**
5. Establish a Center of Excellence-styled training institute	**Leaders/JCS**	**MOE/MIT/NIC**	**Donors/Univ.**
Government Support			
1. Establish private-public Council for IT Services Industry	**Leaders/JCS**	**Council**	
2. Initiate E-Government program/adopt national IT projects	**IT Industry**	**Relevant Ministries**	
3. Focus export and investment promotion efforts on IT	**Leaders/JCS**	**JEDCO/IPC**	**Donors**
4. Develop and implement IT incubator program	**Leaders/JCS**	**NIC/MIT**	**YEA/Univ/ Donors**
Capital and Financing			
1. Develop/attract IT venture capital funds	**Leaders/JCS**	**MOF/MIT**	**Donors**
2. Make funding available at preferential terms		**MOF/IDB**	**Private Banks**
3. Facilitate IT IPOs on the Amman Stock Exchange		**ASE/MOF/ Council**	**Donors**
Infrastructure Development			
1. Provide preferential access to high-speed lines and permit private up-links and downlinks		**JTC/Telecom**	
2. Provide competitive pricing on high-speed lines		**JTC/Telecom**	
3. Initiate private sector-led Information Technology Park	**Leaders/JCS**	**Various**	**Donors**

IT Industry Development

The local IT industry is going through a period of rapid expansion and development. The action plan is designed to accelerate this growth, and to develop healthy industry structures and support mechanisms that will allow greater competitiveness and performance.

Specific objectives include:

- Establishment of a professional IT industry association by the year 2000
- Improving the capacity of Jordanian IT companies to produce and market IT products and services

Action 1: Establish New IT Industry Association. Jordan's IT industry is committed to the establishment of a **professional IT Industry Association** that can more effectively represent the software and IT service company interests. While the Jordan Computer Society can remain to meet the needs of individual IT professionals, a new body is essential to propel Jordan into the future. Following successful role of these bodies in other countries (e.g., NASSCOM, India), the new association can focus on the following activities:

- Advisory, to assist the GoJ in developing policies and strategies for the software and IT services sector
- Marketing and Promotion, to help members increase exports, attract foreign investment, and promote greater awareness
- Networking and Collaboration, to develop efforts to increase collaboration and joint activities by IT companies
- Quality, to provide certification and other programs to upgrade industry quality
- Anti-Piracy, to work with existing bodies to combat software piracy
- Research and Consultancy, to maintain statistics and provide technical support to the industry
- International relations, to represent Jordan's IT industry and establish alliances with overseas bodies to promote networking, awareness, information dissemination, etc.

In all cases, industry leaders must strive to adopt best-practice approaches in these activities, cultivating a professional environment in tune with global standards.

Timing: Immediate, to be completed within one year.
Implementation: IT industry leaders, JCS; technical support from donors.

Action 2: Promote joint collaboration among IT companies. To develop the necessary scale to go after export projects, joint collaborative efforts should be pursued among existing players. These can be in the area of joint export marketing; product specialization; development (work jointly on large offshore programming jobs); training; attraction of international software and hardware vendors that they already represent.

Timing: Start in the short-term and continue on an on-going basis.
Implementation: IT industry leaders, JCS.
Action 3: Improve capabilities of Jordanian IT companies. Technical assistance and funding must be provided to increase firm level capabilities in terms of operations, marketing, project management, software engineering, etc. Companies require state-of-the-art technologies and assistance to improve capabilities that will allow them to aggressively expand exports.

Timing: Start in the short-term and continue on an on-going basis.
Implementation: IT industry leaders, JCS, JUSBP.

Action 4: Develop employee stock ownership programs (ESOPs) for IT firms. Successful international examples of ESOPs for the IT industry should be adapted to increase funding for Jordanian IT companies and also help reduce the problem of brain drain, since ownership will increase incentives of employees to remain in place.

Timing: Start in the short-term and be completed within one year.
Implementation: JCS, technical support from donors.

Action 5: Develop industry quality certification programs. To increase the competitiveness of Jordanian industry, programs to support ISO 9000 and SEI-CMM certifications should be introduced. The JCS should adapt the accreditation programs of overseas bodies such as the Irish Computer Society.

Timing: Start in the short-term and be completed within one year.
Implementation: JCS, technical support from donors.

Regulatory Framework Strengthening

Building on successful liberalization and reform efforts (e.g., the recent removal of import duties on IT hardware and software), the IT strategy aims to further strengthen the policy and regulatory framework for IT sector growth. The action plan is designed to establish Jordan as the most competitive country in the region in terms of IT policies and regulatory systems, with emphasis on facilitation and elimination of restrictive controls.

Specific objectives include:

- Enhancement intellectual property protection
- Adoption of competitive incentive policies
- Streamlining of government procedures
- Development of E-Commerce legislation

Action 1: Reduce indirect taxes on all IT related products. The total tax burden on IT hardware and software is too high. Duties have been lowered, but other GST, fees, and charges remain in place, affecting access of Jordan to competitively priced IT products and services. We propose the following actions:

- Adopt a more comprehensive Customs classification for the IT industry to ensure that it covers all relevant products and components
- Provide zero tariffs on all IT-related equipment, components, media and software

Timing: These actions need to be initiated immediately.
Implementation: Ministry of Finance, IT industry.

Action 2: Streamline Customs clearance procedures. Procedures for clearance of IT imports should be streamlined to ensure quick clearance by one body. The roles of the TRC and other bodies in the clearance procedure should be eliminated. A new instruction—adopting a comprehensive and standardized classification system and clearance procedure—should be issued by the Customs Department.

Timing: These actions need to be initiated immediately.
Implementation: Ministry of Finance.

Action 3: Enforce intellectual property rights (particularly Copyright law). To enhance the IT industry's competitiveness, the GoJ should initiate aggressive enforcement of existing IPR regulations, particularly in terms of Copyrights and Trade Secrets. This can be done jointly with the private sector. In the future, accession to the WTO will enhance these efforts.

Timing: This action needs to be initiated immediately.
Implementation: Ministry of Industry and Trade; NGOs.

Action 4: Amend the Labor Law. To provide software developers with basic protections, Articles 19 and 20 of the Labor law should be amended. Uncompetitive provisions that provide workers with ownership rights over an employer's inventions or trade secrets need to be rescinded.

Timing: These actions need to be initiated immediately.
Implementation: Ministries of Labor, Information, Industry and Trade, Parliamentary Committees.

Action 5: Continue and formalize policy of no censorship of IT media and products. The current lack of enforcement by the Ministry of Information should be continued. In the future, these provisions in the legislation over printed and audible works should be amended to formalize this practice.

Timing: These actions need to be initiated immediately.
Implementation: Ministry of Finance.

Action 6: Adopt more competitive taxation policies. The Council of Ministers is encouraged to take action so that software developers and other IT service firms will receive treatment on par with other prioritized sectors. Specifically, the 15% corporate tax rate allowed for manufacturers in the Income Tax Law should apply to software development and other value-added IT service activities outside of simple re-selling. A more comprensive definition of eligible IT services activities should be developed for application in the Law and its regulations and instructions. Higher depreciation allowances for IT software and hardware should be formalized, rather than being provided on a case-by-case basis. Allowances for training, R&D should be increased and standardized for the industry.

Timing: These actions need to be initiated immediately and concluded in two years.
Implementation: Ministry of Finance, Council of Ministers.

Action 7: Enhance access to IPC incentives and remove limits on foreign investment in the sector. The Investment Promotion law needs to be amended to apply a more comprehensive definition of software and IT services that are eligible for benefits. Restrictions on foreign investment—within the Law and its regulations—should be lifted to permit 100% foreign ownership of IT services enterprises. Minimum capital requirements for foreign investment—as well as treatment of "know-how" as part of foreign invested capital—should be removed, and clarified, respectively. In the future, consideration should be given to amending the Commercial Agents and Middlemen Law to permit foreign investment in IT service areas.

Timing: These actions need to be initiated immediately and concluded in two years.
Implementation: Ministries of Industry and Trade, Council of Ministers, Parliamentary Committees, IT industry, donor technical support.

Action 8: Remove Constraints to employee stock ownership plans. Such programs (ESOPs) are widely used in the IT and other sectors in Egypt, Europe, and the US. This will generally

imply relatively lower salaries (higher capital appreciation benefits) and address the employee rotation and brain drain issues plaguing the IT sector.

Timing: This action is scheduled to begin in the short term and be in place within three years.
Implementation: Ministries of Finance, Planning, IT industry, donor technical support.

Action 9: Sign Information Technology and Customs valuation regulations of WTO. As part of the WTO accession process, Jordan should join the (optional) Ministerial Declaration on Trade in Information and Technology Products. This agreement eliminates all customs duties and other charges on computer, IT and telecommunications products. Countries already party to this accord represent 90% of world trade in these products. Similarly, adopting the Customs Valuation of Carrier Medium Bearing Software and Interest Charges regulation would ensure international standard for customs valuation of IT products.

Timing: This action is scheduled to begin in the short term and be in place within three years.
Implementation: Ministry of Industry and Trade, Council of Ministers.

Action 10: Develop Electronic Commerce legislation. The future of the IT industry is Internet-based applications and transactions. Internet commerce is rising worldwide, including the Middle East. Development and implementation of a comprehensive e-commerce law for Jordan, is an important national priority, essential for the long-term competitiveness of the industry.

Timing: This action is scheduled to begin in the short term and be in place within three years.
Implementation: Ministry of Industry and Trade, IT industry, donor technical support.

Human Resource Development

Human resources count as the most crucial factor for a competitive IT industry. The action plan is designed to substantially strengthen educational and training programs in Jordan, building on the workforce's raw talent and taking advantage of the high level of interest in IT-related careers.

The **overall objective** is to increase the supply of adequately skilled IT manpower and increase the productivity of the IT workforce.

Action 1: Initiate program of activities by the IT industry to benefit IT students. The IT industry can play a major and immediate role as part of the overall effort to enhance the skills of IT students. An integrated program of activities should be initiated in cooperation with universities, secondary and primary schools, including:

- Internship program funded by IT industries (universities)
- Orientation courses to orient new graduates on IT marketplace opportunities and requirements (secondary schools & universities)
- Organization of Job Fairs at major universities, to promote face-to-face discussions between IT leaders and students
- Discounts on courses for software/hardware certifications for promising students
- Development of a Web Site and data base of new university graduates to promote link-ups with IT companies
- Formalization of an on-the-job training program at leading IT companies
- Donation of new/used computers and software (developed by local IT companies) to primary and secondary schools, universities and government agencies

Timing: These are tangible, meaningful activities that can be developed and initiated by the JCS and IT industry leaders immediately.
Implementation: JCS, IT industry leaders.

Action 2: Work with universities to focus on critical skill areas. To iniatiate this process of gradual reform of computer science curriculums and approaches, the JCS should establish IT industry advisory committees with selected universities. These bodies will ensure that skill areas being taught are appropriate and in demand. This will keep local universities abreast of latest techniques and approaches to education. Attention to entrance requirements for students should be given. These can be linked to internship and training initiatives at IT firms as described above.

Timing: These actions should be initiated and developed immediately.
Implementation: JCS/IT industry leaders, universities, donor technical support.

Action 3: Strenghthen IT-industry ties. In addition to the creation of advisory committees, a comprehensive effort should be initiated to establish and strengthen ties between universities, and the Jordanian IT industry. A model program should be developed that includes:

- Funding mechanisms for sponsorship of university research and development
- Process for review and annual upgrading of curriculums of universities to reflect the needs of the IT industry
- Incorporation of corporate certification programs linked to university education
- Establishment of exchange programs between industry and educational institutions
- Establishment of sabbatical programs to encourage faculty to spend a paid sabbatical in industry environments

Timing: These actions should be started in the short-term and be in place within one year.
Implementation: JCS/IT industry leaders, universities, Ministry of Education, donor technical support.

Action 4: Promote collaborations with overseas universities and software/hardware training centers. There are a large number of overseas universities and institutes with specialized capabilities in software engineering and information technology areas. "Twinning" and other relationships should be fostered. In addition relationships for instruction and certification should be established with international software/hardware vendors who have established programs and are setting up such centers worldwide. (These include Microsoft, IBM, Cisco, Novell, Adobe, Macromedia, Oracle, Red Hat, etc.)

Timing: This action is scheduled to begin in the short term and be in place within three years.
Implementation: JCS/IT industry leaders, universities, donor technical support.

Action 5: Establish a model "Center of Excellence"-styled training institute for software and IT services. Drawing upon successful models around, the world, such a center would be a partnership among a university, JCS and/or a new industry association, and corporate hardware/software training center and/or a leading overseas university. Such a Training Center can be established under the primary guidance and direction of the private sector leaders, and would request donor support to plan and develop. Furthermore, such a center would be the first building block in a future technology park. The center would focus on software development, improving marketing, project management, math and technical writing skills. It would also strengthen ties among government agencies, the RSS, NIC, universities and private companies and foster the idea of excellence. Moreover, the Center could act as an accreditation body and a certification entity. A joint committee should be formed to study and develop the proposal, develop a prospectus, secure commitments from overseas partners and other stakeholders.

Timing: This action is scheduled to begin in the short term and be in place within three years.
Implementation: JCS/IT industry leaders, universities, Ministries of Education, Industry and Trade, NIC, donor technical support.

Government Support

There is an important role for Jordan's Government, in spite of the strategy's emphasis on a private sector-led approach. The action plan is designed to focus government support efforts in appropriate areas that will stimulate private sector IT development while improving the delivery of government services.

Specific objectives include:

- High Priority for the IT Industry as part of the National Agenda
- Possess the region's first "Electronic Government"
- Effective promotion of Jordanian IT exports
- Two or more IT enterprise incubators by 2002

Action 1: Establish a high-level body for the Jordanian software and IT services industry. To signal the importance and provide the active support needed for this sector, the Government should establish a high-level Council to facilitate support to the industry. This body should be comprised primarily of private IT industry leaders and include representation from selective Government bodies. The function of the body is to direct national IT strategies for the software and IT services sector, monitor the actions of Government agencies, and ensure full implementation of Government commitments. As in several countries, this entity shall serve as a private-public Apex body looking after the interests of the sector, and ensuring support from the highest levels of the Jordanian government.

Timing: This action should be implemented immediately and be in place within one year.
Implementation: Council of Ministers, JCS/IT industry leaders.

Action 2: Initiate Electronic Government Initiative. Growing Internet access is fueling a boom in the international and regional markets for e-commerce related software and information services. The use of e-commerce directly by national agencies would stimulate local private IT businesses and provide the needed market base from which FDI and job growth can be bolstered. Past emphasis has been placed on government provision of information and inter-agency communication. A stated goal of IT professionals would be to place all basic government services on line, particularly those public entities that provide direct services to citizens and companies of all types. Examples include business licensing and permits, investment promotion and facilitation services, tax filing and administration, electronic government procurement, health care smart cards, and electronic payment of utility bills. The idea could be expanded to incorporate computer-based teaching into primary and secondary schools using software developed by the Jordanian IT industry. As part of this national action, the government sector can assist the IT industry by beginning a new legislative development initiative that will prepare Jordan for substantial opportunities and challenges caused by e-commerce.

Timing: This action is due to begin immediately and will be completed within three years.
Implementation: Relevant Ministries, IT industry

Action 3: Focus export and investment promotion efforts to the IT sector. To take advantage of export market opportunities, Government should ensure that relevant

promotional bodies (e.g., JEDCO and IPC) prioritize the IT sector. The most important priority is funding and support for IT exporters in terms of export marketing, including attendance at major industry conventions such as GITEX. The Government and the IT industry should collaborate in developing a concrete export market plan for the industry. A similar effort should be conducted with the IPC. Investment promotion efforts should be carefully coordinated with the IT industry to ensure that there are concrete efforts at attracting software vendors to the country, not just in terms of full foreign investments, but sub-contracts and other collaborations with local industry.

Timing: This action should begin immediately and be completed within one year.
Implementation: JEDCO, IPC, Ministry of Industry and Trade, JCS, IT industry leaders; donor technical and financial support.

Action 4: Develop and implement an IT incubator program. Drawing upon the successful experience in other regional and international countries, a detailed plan for the establishment of IT technology incubators should be prepared. Once developed, funding should be sought to establish at least two incubators in cooperation with leading universities and institutes. The objective of the program would be to facilitate IT start-ups and commercialization of their products and services.

Timing: This action should begin in the short-term and be in place in three years.
Implementation: NIC, Ministry of Industry and Trade, universities, JCS, IT industry leaders; Young Entrepreneurs Association; donor technical and financial support.

Capital and Financing

A major reason behind the low capitalization of most IT services companies is the difficulty in accessing debt and equity funding. The opportunity exists to develop innovative funding approaches that are tailored for the unique needs of the industry.

Specific objectives are to:

- Create and attract IT venture capital funds to Jordan
- Ensure funding for the industry at preferential terms
- Develop innovative funding approaches

Action 1: Develop and attract Venture Capital funds. Efforts should be initated to establish a comprehensive US-Jordanian IT venture capital fund patterned after similar initiatives in Israel. This fund could be an important model for the development of the venture capital industry. If such a fund is created, tax breaks could be offered by the government to encourage investors in this fund - foreign and domestic. In addition, the private sector can promote the creation of a venture capital fund to focus on IT via a consortium of Jordanian banks. A program to attract US-based IT venture capital funds should also be initiated, particularly those that have been actively investing in offshore software companies.

Timing: This action should begin in the short-term and be in place in three years.
Implementation: Ministry of Finance, Ministry of Industry and Trade, universities, JCS, IT industry leaders; donor technical and financial support.

Action 2: Make funding available to software development and other IT services at preferential terms. Access to debt financing at preferential terms to IT companies should be provided by the Industrial Development Bank, through a special window or other mechanism. This should be promoted by the Government following successful models in other countries.

Timing: This action should begin in the short-term and be in place in three years.
Implementation: Industrial Development Bank, Ministry of Finance, other private banks.

Action 3: Facilitate IT firm Initial Public Offerings on the Amman Stock Exchange. companies. Laws and regulations must be adjusted so that IT firms can go public without requiring past records of profit, in conformance with standards in countries of leading IT firms. What is needed is the provision of technical assistance in the areas of **IPOs** and **software company valuation,** which is needed to ensure the correct value for a company raising capital in an equity share situation. Such technical assistance would be instrumental in enabling IT firms to benefit from the huge capital market opportunity offered by "going" public.

Timing: These actions need to be initiated in the short-term and concluded within three years.
Implementation: Amman Stock Exchange, Ministry of Finance, Council of Ministers, donor technical support.

Infrastructure Improvement

Appropriate infrastructure and facilities are essential for a thriving IT industry. Unfortunately, many regional countries have adopted uncompetitive approaches. Problems have included high prices and low quality of telecommunication services, as well as technology park and related estate development initiatives characterized by public sector domination and outdated central planning approaches. For Jordan to succeed, it must break this pattern and distinguish itself as a regional leader. In this regard, the action plan is designed to substantially increase the quality and cost competitiveness of IT-related infrastructure and facilities in Jordan.

Specific objectives include:

- Better availability of high-speed telecommunication lines to IT companies.
- More competitive prices for high speed dedicated lines
- Development of an Information Technology Park by the year 2002

Action 1: Make high-speed lines available to software developers and IT service companies on a priority basis. To ensure competitiveness, IT firms need to count on immediate installation of new lines as they expand and as data transmission requirements intensify. Minimum response times should be defined according to international best practice. If these cannot be met, IT firms should have the opportunity to seek alternative means to satisfy their needs, including private up-links and down-links.

Timing: This action should be implemented immediately.
Implementation: JTC, Ministry of Telecommunications.

Action 2: Provide competitive pricing on high-speed telecom connections for software developers and other IT service firms. Prices must be comparable to those found in other IT exporting countries and recognize non-proportional cost increases as bandwidth expands due to economies of scale.

Timing: This action should begin immediately.
Implementation: JTC, Ministry of Telecommunications.

Action 3: Plan and develop information technology park. This multifaceted project must conform to international standards while offering an appropriate mix of infrastructure, facilities, and supporting institutions to meet the needs of Jordanian firms. The private sector must play the lead role in planning and investing in this project, while the Government and

perhaps relevant donors provide appropriate coordination, oversight, and support. Feasibility studies must be undertaken prior to commiting to a given location. Efforts should be made to involve IT park developers and experts who can bring experience, capital, and promotional assets (incuding brand-name *cache*) to the project.

Timing: This action should begin in the immediately and be in place in three years.
Implementation: IT industry leaders & respective industry associations (JCS and/or new); relevant Government agencies; donor technical and financial support.

4.5 CONCLUSIONS

Jordan's IT industry is poised for rapid growth, and to become a major contributor to the country's economy and strategic interests. A concerted effort led by the private sector, yet actively supported by the Government and other stakeholders, is the key to unlocking this potential.

The Information Technology Revolution is well under way. At no other time in history has it been so important for countries such as Jordan to position themselves and take action in the face of dramatic changes caused by technology. Countries that fail to do so will be condemned to prolonged if not permanent disadvantages. Catching up becomes more difficult with every day that passes. On the other hand, those with natural advantages that succeed in positioning themselves now, and creating a conducive environment will find a growing world of opportunities.

Jordan is on the road to becoming an IT success story. By acting on the strategy outlined in the present report, and most importantly, by implementing the above described action plan in a committed and comprehensive fashion, Jordan's leaders-- both in industry and in Government--will play instrumental roles in strengthening the country and creating a limitless world of opportunities for generations to come.

Annex A1

ANALYSIS OF LAWS AND REGULATIONS CONCERNING INFORMATION TECHNOLOGY IN JORDAN

A.1 INTRODUCTION

The following presents details of the legal and regulatory assessment conducted by AMIR consultants[1] to support the development of the REACH strategy and action plan. The tables included at the end of this annex summarize the results of the assessment in the form of a matrix.

A.2 CONSTITUTIONAL ISSUES

Article 117: Exploitation rights of public utilities shall only be granted by concessions. Thus, private participation in the establishment of Technology Parks will need a concession law. Identifying the structure of the capital involved and the capital advantages and disadvantages of concession laws will be needed.

Articles 114,120: Separate financial and administrative regulations should be issued to regulate any government work including governmental based Technology Parks.

A.3 JORDANIAN LABOR LAW

Article 12: Employment of non- Jordanians is subject to the Minister of Labors approval provided that no Jordanian worker has the efficiency; priority is given to Arab workers. This should be amended to allow access to foreign workers in a fast and efficient manner.

Article 20: An employer does not have the right over a new invention produced by the worker, unless the work entrusted to the worker requires that he should devote his efforts for the invention, in such case he is still entitled to up to 50% depending on several facts. This provision does not reflect the Best Practices in this area; it should be amended to do so.

Article 19: A worker should reserve his employer's trade and industrial secrets even after the termination of employment. There is a new law for trade secrets that would support the preservation of business and technical secrets of IT investments; this law should be supported.

A.4 TAXATION

Income Tax Law

Article 3: All taxable income is specified in this law. However the general rule is that income earned in or generated from the Kingdom is subject to income tax. A notable thing is that profits earned from exportation are subject to income tax, this rule should be eliminated or at least IT sector exports exempted, although this might create some contradiction with the WTO should this be considered as export subsidy.

[1] **International Business Law Associates**—Salah Al Bashir, Dana Janbulat, Ahmed Anani, and others.

Article 7: Capital gains are exempted from income tax. In addition, all the income benefiting from the agreements preventing double taxation. The Council of Ministers might exempt any patent or copyright subject to income tax. This exemption however should be provisional and not subject to the approval of the Council.

Corporate Taxation

Article 9 determines the expenses and disbursements that shall be deducted from income for the purposes of calculating income tax. Those expenses and disbursements are generally the ones incurred for production. However, the depreciation included in this law to be deducted does not allow for accelerated depreciation of computers and does not allow for IP rights depreciation. According to the Income Tax Department, the 15% depreciation rate applicable to most IT equipment can be doubled on a case-by-case basis. This instruction needs to be standardized and formalized by regulation.

Loss Deduction

Article 10, 11: Any loss sustained from one source of income shall be deducted from income from other sources in the same year. If the loss can not be wholly deducted the remaining balance shall be carried to the next years up to six years after the loss occurred. It is important to know that non-taxable gains are non-deductible losses. Permitted deductible expenses are also specified although those deductions must be streamlined. Allowance for salaries and other wage deductions are too low for professional services, and should be increased to JD 12,000/year.

Corporate Tax Rates

Article 17: The tax on the companies that provide IT services is 25% of its income compared to 15% on IT services companies. This tax should be 15% on both the manufacturing and the services parts of the IT sector. This article also imposes a 10% distribution tax on profits of shares and distributed dividends of a company except for the profits distributed in the form of share contributions to increase capital. Included in those profits are the profits transferred abroad by any foreign company operating in Jordan.

Tax Withholding

Article 18: Every person upon paying an income to a non- resident and such income is subject to tax according to the Income Tax Law must deduct 10% of this amount.

Exemptions from Personal Income Tax

In general, wages and salaries generated in the Jordan are subject to taxes. The law draws distinction between foreign employees and locals on one hand and between private and public sector employees on the other hand. Salaries and wages paid by foreign company registered in Jordan to a non- Jordanian employees, 50% of the wages and salaries of public sector are exempted, 50% of the first 12000 JD of the salaries and wages of the private sector is exempted and 25% of the amount above that. These need to be standardized.

Instructions on Depreciation Percentages

Annex 1: The depreciation for industrial buildings is 4%, furniture 10%, appliances that work by electricity and all factory machinery and appliances 10% and computers 15%. Hardware and software, however, depreciate faster so the depreciation percentage should be higher.

Sales Tax Law

Article 7: The Council of Ministers has the authority to exempt any local products from this tax. It is recommended to push for exempting software and computers.

Article 5: All goods, whether locally produced or imported are subject to sales tax excluding those exempted by a special provision or by this law or its appendix. Local and imported services specified in appendix 4 are subject to sales tax except those services that are subject to Added Tax.

Article 6: Sales tax is 13% of the value of imported or locally produced goods and services subject to this tax. 0% tax will be imposed on exported goods and services. The Council of Ministers has the authority to impose additional sales tax. It should be ensured that no additional tax is imposed on IT equipment and products.

Regulation on Limits for Purposes of the General Sales Tax

Article 2: The limit for regulation is 50000 JD for local goods subject to ratio tax, 25000 JD for local services subject to tax, 25000 JD for combining the production of goods subject to ratio tax and the provision of local services subject to tax and 10000 JD for the local goods subject to tax in kind.

A.5 INVESTMENT

Investment Promotion Law

Article 3: Industry is a sector enjoying all the incentives provided in the Investment Promotion Law however, services is not included in this law, but can be included by a decision of the Council of Ministers. The Software industry is eligible under the law, but IT-related services are not. A more comprehensive definition of the Software and IT Services industry has to be developed to ensure full access to benefits and privileges under the law. The proposed definition of the IPC—as part of proposed amendments to the Act—need to be further elaborated to ensure full coverage of the IT sector.

Article 5: This article describes all what is considered as (invested foreign capital). It is recommended that the Know-How be considered as an intangible right and therefore falling under this article.

Article 6 states that fixed assets and spare parts for a project are exempted from the customs fees and taxes when imported. The definition of qualifying IT and computer equipment, parts and software has to be revised to ensure that all direct and indirect inputs needed by the industry are included. These privileges need to be extended to all IT-related services in addition to software companies.

Article 7: This article adds more incentives to investment projects. Exemptions for ten years from income tax and social services tax are provided for in this article, the percentage depends on the area. Additional exemptions shall be given not exceeding four years if the project has been expanded, developed or modernized with the result of increasing production capacity of one year not less than 25%. The points made above regarding the defintion of the industry are also applicable here.

Article 24: Non- Jordanians may invest in Jordan in any legal form and are given the same treatment as the Jordanian investors. There are some restrictions on ownership percentages in other laws and regulations, allowing 100% foreign ownership would be more encouraging. In

addition, Article 24(C) should be streamlined to permit access to foreign technicians on a streamlined basis.

Article 26: This article requires investors to keep records of their admitted fixed assets and furnish any information upon the Investments Corporations request. It also gives access to authorized employees of the Corporation to the project for the purpose of checking on the accuracy of the information. This procedure burdens investors with more costly and inefficient responsibilities.

Articles 27, 28: The transfer of the project to another owner will not cease its enjoyment of all the incentives in this law. Exempted fixed assets can also be sold, but duties have to be paid if not sold to another exempted investor.

Article 30: The non- Jordanian investor has the right to remittance of capital, returns, profits and proceeds of sale or liquidation in foreign currency. This is a favorable provision.

Article 31: Encourages non-Jordanian technicians and administrations by allowing workers to transfer their salaries and remuneration abroad. This is a favorable provision.

Article 33: Provides for ADR. A final settlement of investment dispute shall be in the International Center for the Settlement of Investment Dispute. This is a favorable provision.

Regulation on Non-Jordanian Investment Promotion

Article 3: Non- Jordanian investors may not own more than 50% in the sector of commerce and commercial services. IT industry and services projects may very well fall under this sector, therefore, we should clearly provide for full foreign ownership in this sector.

Article 4: This article prohibits that non- Jordanian investments be less than 50000 JD, this discourages useful, although small, investments.

Regulation on Investment Areas and Sectors

The regulation divides Jordan into areas for the purpose of distinction in the tax exemptions. Some of the more important areas are Ajloun 75%, Ma'an 75%, Aqaba (Quairah) 75% and Aqaba (Kazba) 50%.

A.6 FREE ZONES AND INDUSTRIAL ESTATES

Free Zones Corporation Law

Article 7: This article states that all the investment applications are for establishing industrial, commercial and storage projects. It is not clear whether this article includes IT services as one of the investments in the Free Zones or not.

Article 15: Gives the Corporation the right to increase the amount of rent once every three years. This one sided and unpredictable right of the Corporation that might discourage prospective investors.

Utilization of the Free Zones Regulation

Article 2: Defines the project as any commercial or industrial investment project. This might not give space for IT service investments to be included.

Article 3: This regulation shall be applicable to all Free Zones and the Council of Ministers may, upon the recommendation of the Board, order its application on any of the Free Zones. There is a path in this article for the establishment of Private Free Zones/Technology Parks although this is not directly stated; it is recommended that this article be amended to state clearly the possibility of establishing Private Free Zones/Technology Parks.

Article 14: Manufacturing and factories may be established in the Zone under license and the Board may permit the establishment of any other projects or investment enterprises in the Zone. Does not clearly include software and IT services, although the term (other commercial activities) might be interpreted as such.

Article 15: The industrial investment in the Zone shall be directed towards its exportation abroad. The Minister of Trade and Industry may upon recommendation of the Board allow the entry of a percentage of the industrial products of such Zone to the domestic market. This article does not include services and is only limited to industrial investment.

Article 18: These decisions shall be made by the Director General upon the recommendation of the Director within the plan approved by the Board. The Director General's authorities are broad and the rules governing the rent are not transparent, the article should also state the type of investments the lands and constructions will be rented to, and to provide for market driven pricing. This could adversely affect prospects for a private technology park.

Article 19: This article specifies the lease periods for different projects. According to this article services are not included and the Directors Generals authorities are broad, market driven prices should prevail. This could adversely affect prospects for a private technology park.

Article 27: The Board is entitled to issue instructions necessary for the implementation of these regulations including devising procedures regulating the licensing of industrial, commercial and service enterprises in the Zone. This needs to be amended to incorporate a full definition of software and IT services.

Aqaba Free Zone Regulation

Article 17: This article limits the projects to be established in the Zone. Basically only projects of manufacturing are permitted and services are not included.

Article 18: The Director shall decide on whether to approve the rent applications or refuse them without stating the facts, which gives him very broad authorities and gives investors uncertainty.

Article 66: This article states that manufacturing projects in the Zone might enjoy the incentives in the Investment Promotion Law, it also includes implementing the provisions of privileges in the mentioned Law on corporations with commercial characteristics within the Zone, if there was an essential value to Jordan's economy. This article does not mention services by any means.

Jordan Industrial Estates Corporation Law

Article 6: This article lists the objectives of the Corporation, these objectives only focus on planning, implementing, administrating and promoting manufacturing projects and not services or even commercial projects.

Article 7: This article lists the Corporation's authorities, those authorities are limited to the establishment and formulation of manufacturing projects, and providing administrative, financial and technical consultations to existing manufacturing projects. It is not clear whether the industrial enterprises include services but most probably and judging on the direction of this regulation, services are not included.

Article 8 lists, in addition to the incentives in the Investment Promotion Law, a few more incentives including exemption from income tax and social services tax for 2 years, and exemptions from the land and property taxes. This article also encourages already existing projects to move in the industrial estate by exempting them from income and social services taxes. The exemptions only falls on manufacturing projects, services are not included.

Article 17: States the undertakings of the Board, which include approval of the applications for the establishment of factories in the Industrial Estate and the determination of the rent thereof. This article however, should be amended to compel the Board to approve complete applications or state a reason for disapproval.

Article 30: This article gives the Corporation the right to increase the amount of rent on its lands, constructions and properties in such a way as not to exceed in its total 50% per year, which is a very loose authority and a very high percentage.

Instructions for the Registration of Companies and Factories in the Jordanian Free Zones

Article 2: This article defines the activity of the to be registered company or factory to include manufacturing, services, commercial works and others, and defines the company to be registered to include the performance of a commercial, industrial or agricultural activity or the performance of a service. It is assumed that software and IT services are covered.

State Land Administration Law

Article 7 is the only article in this law that states that the leasing of the State Dominion for non-agricultural purpose shall be by a decision of the Minister and upon the recommendation of the Director General, without a declaration, provided that the other rules and conditions of the leasing be determined in a Regulation. The law should be amended to include articles that govern the use of lands for purposes other than agriculture, e.g., for development of a technology park.

Regulation of Delegating and Leasing the State Dominion and Its Amendments

Article 2: Gives the Council of Ministers the right to delegate or lease the State Dominion to manufacturing, mining, tourism or to housing projects and other relevant services. It does not include leasing for commercial purposes and consequently to commercial services.

Article 6: The article states that the annual amount of rent for leasing the State Dominion for nonagricultural purposes shall not be less than 8% from the determined of land value. The article does not include the amount of rent for manufacturing or services projects.

A.7 TELECOMMUNICATIONS

Telecommunications Regulatory Commission Law

By virtue of this law, a Governmental Agency was established "The Telecommunications Regulatory Commission", which has the duty of regulating the telecommunications sector and ensure competitiveness.

Article 12: Gave the Council of Ministers the right to license any person or entity to work in the field of telecommunication. The Council should allow the establishment of private communications networks.

The Committee will be responsible to set the prices of services when the market is monopolized. Government interference is discouraging even for a noble cause.

A.8 INFORMATION

Law of Monitoring Visual and Audible Works

Article 3 states that no person; entity, shop or exhibit can exhibit any works unless the exhibition and the work are certified by the Board. This is a restriction on investment in IT activities.

Article 2: Defines the Work as every visual and/or audible material recorded on tape or on disk or recorded by any other means. It also defined Exhibition of Work that it is exhibiting work in a public place or a shop specialized in exhibiting, selling, leasing, distributing, circulating, preparing or partially or wholly producing works for any of those purposes.

A.8 RETAIL

Commercial Agents and Middlemen Law

Article 4: According to this article, only Jordanians, whether natural persons, partnerships or corporations can practice as commercial agents and middlemen. The article should be amended to allow foreigners to practice too.

A.9 IMMIGRATION

Non- Jordanians working in Jordan need to obtain temporary residency permits, which prove that they possess educational qualifications not available in Jordan and/or that their employment does not deprive Jordanians of work opportunities. Foreign investors may be granted permits only if their projects are approved by the Ministry of Trade and Industry. This should be amended to allow foreign workers and to guarantee visas and work permits for IT sector workers.

A.10 LAND

The Council of Minister's approval is not required for purchases by Arab nationals, Palestinians and Jordanians unless otherwise specified. Nevertheless, the Council's approval is needed for transfer of property to non- Jordanians. Non- Jordanians need the Council of Minister's permission to lease any real estate for more than 3 years consecutively or in total. Purchase of real estate by non- Jordanian natural persons is allowed only within cities and villages (municipalities) and their greater basins, or in areas within an existing urban plan. Purchase should be strictly for residential and/or business purposes.

Purchase by Juridical Entities: Any juridical person registered in Jordan and working in industry, commerce or finance may purchase estate only within cities and villages (municipality), and strictly in the amount needed for business purposes.

A.11 TRADE

Import and Export Law

Article 3: This article states that all imported and exported goods must obtain a license for importation and exportation unless such goods are exempted by virtue of this law or any other subsequent regulation. The article should be amended by eliminating all import licenses and prior approvals if applicable.

Article 8: Gives the Council of Ministers the right to confine the importation and exportation of certain goods of the government. Serious government interference can be noticed.

Article 9: Gives the Council of Ministers the right to ban importation and exportation of certain goods except upon approval.

Article 12: Gives the Council the right to issue regulations that states the fees on importation and exportation, and regulate the issuance of licenses.

Import and Export Regulation

This regulation was issued to determine which goods are exempted from import and export licenses. It states that all imported and exported goods are exempted except for certain goods. The IT sector related goods under this regulation are exempted from any fees.

Law for Unifying Additional Fees and Taxes Levied Upon Imported and Exported Goods Produced Locally

Article 8 of this law cancelled all taxes and fees, which were, levied on imported goods and which the Unified Tax Law, Unified Additional Fees Regulation, Import and Export regulation, additional Tax Law and article 9 paragraph B of the Customs Law imposed. This is a favorable provision, as single tariffs are imposed rather than multiple fees.

Customs Law

Article 24: The origin of goods is the country of production, the source of goods is the country from which the goods are directly imported. The goods produced in a country are those which are made in or produced entirely from that country. This provision should be studied in terms of market access by IT producers and the need for technology protection for market access.

Article 25: The origin of goods produced in more than one country shall be the country of the last manufacturing stage, provided production there is carried out within a proposed build project set up for the manufacture of a new product. Goods imported from a source other than the country of origin and which are put for domestic consumption in the source, shall be subject either to the customs and tariffs applicable to the goods from the source or to tariffs applicable to goods from the origin which ever is higher.

Goods, which under go additional manufacturing in other than the country of origin, shall be subject either to the tariffs applicable to goods from the country of origin or the tariffs applicable to the country of manufacture depending on the extent of additional

manufacturing. Those rules of origin should be applied for technology protection for market access. These provisions should be studied in terms of market access by IT producers and the need for technology protection for market access.

Article 26: Imported goods shall be subject to proof of origin and the Department may require additional evidence about origin if the authenticity of the certificate of origin presented is doubted. This provision should be studied in terms of market access by IT producers and the need for technology protection for market access.

Article 27: Rules of preferential origin shall apply pursuant to the treaties and other parties that provide for preferential treatment. This provision should be studied in terms of market access by IT producers and the need for technology protection for market access.

Article 133: Foreign goods under this article are allowed to enter the Kingdom for processing, principally whether the beneficiary is a manufacturer or an exporter, but for exportation purposes it shall be allowed in Jordan within a period not exceeding three years. Guarantees should be submitted to ensure payment, however, the process and form of guarantees are cumbersome.

Article 134: Goods, which are manufactured from materials, imported for manufacturing purposes may be put for local consumption upon the Director's approval. The imported materials that was used for manufacturing shall be subject to appropriate duties, fees and taxes at the rate effective on the date it was entered to Jordan. The assessment of those duties, fees and taxes will be on the bases of the value of the material on the date of entry.

Article 28 deals with the calculations of customs duties. This article determines the customs value for purposes of calculating duties to be the transaction value that is the price actually paid or payable for the goods, although we recommend adopting the valuation amendment made for WTO purposes. This article also determines for the purposes of calculating transaction value that royalties and license fees of using the concession right related to the goods are part of the price paid for the goods. Consistency with the WTO provisions is required, particularly in terms of the Customs Valuation of Carrier Bearing Software and Interest Charges regulation, which would ensure international standard for customs valuation of IT products.

Customs Procedures Regulation

The entry of imported hardware and software has to be approved by three entities, and those are: The Institute of Metrology and Standards, Telecommunication Regulatory Commission and The Customs. This is extremely cumbersome and should be simplified.

Article 122: This article states that foreign goods may be brought into the Free Zones and moved out to non- customs area without being subject to import or prohibition restrictions or duties and taxes, while national goods may be admitted to the Free Zones, however, they shall become subject to import and prohibition restrictions, custom duties, export fees and taxes.

Article 123: The goods imported for local consumption shall not be allowed to be transferred or brought into Free Zones except by the approval of the Director.

Article 128: Goods of foreign origins leaving Free Zones in their original form and entering the Customs Territory shall receive the same treatment as that of foreign goods.

A.12 EDUCATION

The University of Jordan Teaching Faculty Regulation

Nothing is mentioned about computer literacy in the requirements of lecturers of Faculty members, however the University will promote any work that will be beneficial to it or enhances its projects. In addition to the above policy, this regulation compels the University to obtain latest updates and keep in touch with all nuances. The University must require its Faculty members and staff to have basic computer knowledge.

A.13 GOVERNMENT PROCUREMENT

Supplies Regulation

Article 12: In considering offers the competent authority is required to give priority to supplies produced in the Kingdom. We recommend that equal treatment be given to foreign and local products, however giving priority to local supplies and suppliers might be useful to encourage investment in IT sector inside Jordan.

Article 13: According to this article IT products and services under this article can be purchased from the countries that we have agreements and protocols with.

Article 14: This article imposes restrictions on buying government supplies, including IT products from a foreign supplier. Those restrictions are unavailability and usefulness.

Government Works Regulation

Article 6: This article determines the rules of choice when there is a tender relating to the supply of public works or government technical services. Those rules apply the competition principal, however this principal can not be complete unless they actually allow full competition that is even with foreign investors.

ASSESSMENT OF LAWS BEARING ON INFORMATION TECHNOLOGY

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
Constitutional Provisions			
The Constitution	***Article 117*** Exploitation rights of mines and minerals or other public utilities may only be granted by concessions sanctioned by law.	If private participation is envisaged in establishing Technology Parks, concession laws most probably will be required.	Further study of the structure of the capital that will establish Technology Parks.
	Article 114 The Council of Ministers may with the approval of the King issue regulations for the control of the public funds and the organization of the government stores. ***Article 120*** Administration structure of Government departments, appointment of civil servants, their dismissal, supervision and limits of their powers and competence shall be determined by regulations issued by the Council of Ministers with the approval of the King.	Separate financial and administrative regulations should be issued to regulate a governmental based Technology Park.	The cost and time required of such a process should be studied.
Labor Relations			
Civil Code	Is a general law and is preceded by the labor law.		
The Jordanian Labor Law no 8 of 1996	***Article 12*** It is prohibited to employ a Non-Jordanian worker except by the Minister's approval and on the condition that the work requires expertise and efficiency not available in Jordanian workers or the number of such Jordanian workers is insufficient to meet the need. Priority should be granted to Arab experts, technicians and workers.	The access to foreign experts is somehow restricted. Studying the approval criteria in the IT sector at the Ministry of Labor might also be helpful to make changes.	Allow the foreign experts to be accessed in a fast and time efficient manner.
	Article 20 a-Without prejudice to paragraph (b) of this article, the employer does not have a right over a new invention produced by the worker even if such worker produced such an invention during his work. Priority to	Employee will almost certainly share the ownership of the intellectual property if not own it wholly for himself despite any prior signed waivers.	This provision should be amended to reflect International Best Practices in this area.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	buy such an invention shall be granted to the employer. b- If the work entrusted to the worker requires that he should devote his efforts for the invention, such a worker may share in the rights of such an invention up to 50%. Determining such a percentage should take into consideration the value of the material and mental effort provided by the worker, the tools and instruments used and other facilities provided by the employer.		
	Article 19 b. The worker shall, in accordance with customs and the agreement, preserve the employer's trade and industrial secrets. He should not divulge them in any manner even after the termination of the employment.	The business and technical secrets of IT investors shall be preserved. This should help further IP protection.	Support the passing of Trade Secrets law currently under discussion at the MIT.
Taxation			
Income Tax Law no.14/1995	***Article 3 (a)*** THE GENERAL RULE is that income earned in or generated from the Kingdom is subject to income tax. The following sources of income earned in the Kingdom shall be subjected to tax: 1st. Profits from work, craft, business, profession or vocation. 2nd. Salaries, wages, allowances and bonuses received from any employment including allowances for housing and lodging except for the hosting and representation allowances and allowances for living and travel. 3rd. Interests, commissions, discounts and exchange		

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	differences. 4th. Earnings accrued from any contract concluded in the Kingdom. 5th. Earnings accrued from any obligations such as consultation and arbitration services. 6th. Rents of real estate and other immovable property, and any other profits, earnings and use accruing from them, also any earnings from a property other than real estate. 7th. Key money or vacating money. 8th. Amounts received from selling, hiring or concession granted for using any trademark, patent, design or copyright. Taxable amount under this item shall be distributed over 3 years period. 9th. Income from insurance business. 10th. Sale of assets governed by the rules of depreciation. 11th. Any other profits or gains derived from any other sources not included above and which have not been explicitly exempted from this law.		
	Article 3 (c) Profits earned from exportation shall be deemed to be derived from the Kingdom and are subject to income tax.		Eliminate the exemption or exempt IT technology (export subsidiary against WTO)
	Exemptions:		
	Article 7 (a) CAPITAL GAINS shall be exempted from income tax.		
	Article 7 (b) (11) It shall be exempted from the income tax also: The income that is eligible to benefit from the agreements on preventing double taxation.	In favor depending if the country has such an agreement with Jordan.	Unification of taxes with all the WTO countries.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	Article 7 (b) 13 The income earned from patent, copyright or reward subject to the Council of Ministers.	In favor of IT software development and industry except that it is subject to approval of the Council of Ministers.	Leaving this decision to the Council will cause arbitrary decisions and uncertainty about this issue and this will be an obstacle for investments especially in software development.
	Corporate Tax **Deduction of Expenses**		
	Article (9) In order to determine the taxable income, the expenses and disbursements incurred for the production shall be deducted amongst them are: B. Rental pays. C. Wages and salaries paid. D. Taxes and fees paid. E. Amounts paid for the social security or provident funds. F. Termination of services benefits. G. Bad debts arising from any work or trade or craft or profession even if such debts were payable prior to the beginning of the year and any amount recovered in the following years shall be considered as income for that year. (The law defines what are the debts in details). H. Amounts spent in the repair of the real estate, equipment and machinery and replacement of spare parts or tools. 9th. Amounts paid for replacement of equipment and machinery. 10th. Depreciation and wear of buildings, equipment, machinery and furniture, which are used to generate income, the percentage of such deductions will be	Does not allow for accelerated deprecation of computers, and does not allow for IP rights deprecation	Adopt the International best practices in this regard.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	determined by regulations issued for this purpose. When deductions are made the following rules will be followed: 1. The value of the land should not be depreciated. 2. All information about assets should be submitted. 3. The total deduction of depreciation, wear and tear should not exceed the original cost. 4. If the gross income at any year is less than the depreciation, the balance should be carried forward to the next stage. 11th. Establishment and pre-operation expenses, including the feasibility studies' expenses, shall be amortized over a period not exceeding five years from the date of earning profits. 12th. The share of the branch in the costs of the center or head office situated outside the Kingdom, provided that deduction will not exceed 5% of the taxable income of the branch.		
	Loss Deduction		
	Article 10 (a) If any person sustained a loss during the year from one of its sources of income, the loss shall be deducted from his income from other sources in the same year.		
	Article 10 (b) If the loss reached an amount which can not be wholly deducted as mentioned in (a) above, the balance of this loss shall be carried forward to the next year and then to the subsequent year up to 6 years after the year when the loss occurred. The balance carried forward to each year is deducted from the taxable income of that		

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	year.		
	Article 10 (c) A loss that, if being a profit, will not be taxable by terms of this law, shall not be allowed to be deducted. Loss shall not be deducted or carried forward unless correct and proper accounts are submitted.	Non taxable gains are non-deductible losses.	
	Article 11 Deductions are not permitted on the following: 1st. Household, private and personal expenses. 2nd. The cost of any construction or improvements which increases the capital value. 3rd. Amount withdrawn from capital intended to be employed as capital in any activity. 4th. Any loss or expense recoverable under an insurance policy or compensation contract. 5th. Capital loss. 6th. Amounts earmarked as compulsory reserve or optional reserve or any other reserves with the exception of insurance reserves according to the instructions of the director. 7th. Amounts paid as income tax or social services tax. 8th. Any capital disbursements. 9th. Salaries or wages or any other taxable amount under this law. 10th. Any wages, salaries or any other amounts of money received by a partner in a Joint Limited Company in consideration for his work in management or as a director, or amounts of money received by a share holder in consideration of his work in or management of any limited private company	Too low income for professional firms	Streamline these deductions. Allow for a 12000 JD deduction

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	which exceeds 3,600 JD per year.		
	Corporate Tax Rates		
	Article 17 (b) (1) The tax on industrial sector will be 15% of income. Article 17 (b) (3) The tax on companies that provide IT services is 25%	IT services are treated less favorably than manufacturing.	Subject the IT sector for 15% tax
	Distribution Tax		
	Article 17 (repeated) A. Profits of shares and distributed dividends of the company shall be subject to a distribution tax of 10%, except for the profits distributed in the for of shares contributions to increase capital. This tax shall be withheld by the company and paid to the tax department.		
	Article 17 (b) The profits transferred abroad by any foreign company operating in the Kingdom shall be distributed profits for the purposes of the article and therefore shall be subjected to the distribution tax.		
	Tax Withholding		
	Article 18 Every person, upon paying an income to a non resident, and such income is subject to tax according to this law, must deduct 10% of this amount.		
	Exemptions From Personal Tax		
	In general wages and salaries generated in the Kingdom are subject to taxes. The law draws distinction between foreign employees and locals on the one hand, and between private sector and public sector employees on the other hand. Salaries and wages paid by a foreign company		

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	registered in the Kingdom to its non-Jordanian employees. 50% of the wages and salaries of public sector are exempted. 50% of the first 12,000 JD of the salaries and wages of the private sector is exempted and 25 of each Dinar thereafter.		
Instructions No. 3/1996 "On the Depreciation Percentages"	***Article 2*** When deductions are made, the following rules must be followed: 1. The value of the land should not be depreciated. 2. All information about assets should be submitted. 3. The total deduction of depreciation and wear and tear should not exceed the original cost. 4. If the Gross Income at any year is less than the depreciation, the balance should be carried forward to the next year.		
Instructions no.3/1996 "On the Depreciation Percentages" Annex 1	The depreciation percentages are : 1. For industrial buildings 4% 2. For furniture 10% 3. Appliances that work by electricity and all factory machinery and appliances 10% 4. Computers 15%	The depreciation for most of IT related Equipment and machinery is 15%. But it could be accelerated	
"Sales Tax Law" no. 6/1994 as amended by Law no. 15/1995	**The Exemptions**		
	Article 7 The Council of Ministers has the authority to exempt any local products from this tax.		If Software and computers are not exempted yet, we recommend that they should be exempted.
	Article 5 1st. Goods whether locally produced or imported are subject to the tax excluding those excepted by a special provision or by this law or its appendix 1. 2nd. Local and imported services specified in appendix 4 to this law are		

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	subject to the added tax according to the law no. 28 of 1969.		
	Article 6 1st. 13% Sales Tax of the value (price) on imported or locally produced goods and services subject to this tax, 0% tax on exported services. 2nd. The authority of the Council of Ministers to impose additional sales tax on imported or locally produced goods. 3rd. The lists provided in the appendices are considered part of the law not to be amended only through a subsequent law.		Ensure that no additional tax is imposed.
Regulation no. 18/1994, "Limits For Purposes of the General Sales Tax Regulation" and its amendments.	***Article 2*** The limit for regulation is: 1st. 50,000 JD for the local goods subject to ratio tax. 2nd. 25,000 JD for locally provided services subject to tax. 3rd. 25,000 for combining between the production of goods subject to ratio tax and providing local services subject to tax through a year. 4th. 10,000 for the local goods subject to tax in kind through a year. 5th. For the purposes of this Law, the limit for regulation is considered to be the point where a person has to register himself in the Department on the basis that he is obligated to pay tax according to law.		
Law no.27 of 1952, "Revenue Stamps Fee Law and its amendments."	Revenue stamps fees must be paid on any document of the documents specified in appendix 1 of this law. The person benefiting from the document pays this fee.		Exemption.
Law no. 89 of 1953, Social Service Tax Law for the year 1953.	The tax is imposed on taxpayers of the following fees and taxes: 1. Livestock containing		

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	tax. 2. Land tax and unified tax. 3. Custom fees unless this conflicts with the additional unified taxes and fees law. 4. Income tax.		
Regulation no.2/1954, Collecting Social Services Tax Regulation for the year 1954.	This tax is imposed and collected by a competent authority responsible for collecting each of the mentioned taxes and fees in the law.		
Regulation no. of 1988, Education Tax Regulation for the year 1988.	A tax on the lessee or the owner of an estate calculated as 2% of the annual rate.		
INVESTMENT			
Investment Promotion Law no. 16/1995.	***Article 3*** "Any project falling within the following sectors or sub-sectors shall enjoy the exemptions and facilities provided by this law: 1. Industry 2. Agriculture sector. 3. Hotels. 4. Hospitals 5. Maritime transport and railways. 6. Any other sector or sub-sectors the Council of Ministers approves of upon the Council's recommendation.	In favor of the IT industry that is eligible to benefit from this law, whereas SERVICES in IT (such as software development) is not a sector that is encouraged by the law so it will not enjoy the incentives and the exemptions. The definition of Industry is stated in Regulation no.2/1996 below.	Provide incentives for all IT activities.
	Article 5 The "invested foreign capital " shall mean : One. Cash. Two. Assets in kind. Three. Profits, returns and reserves resulting from investing foreign capital in the project and which are used to increase capital of the same project or in another project. Four. Intangible rights such as licenses, trademarks, patents and trade names registered in the Kingdom.	In favor.	The know-how should be considered as intangible right and falls under item D, never the less it is better to state this clearly in the law.
	Article 6 The incentives are: Fixed assets and spare parts	In favor. Services are excluded.	Provide Incentives to IT activities.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	for the project are exempted from the custom's fees and taxes when imported. Fixed assets are defined as the machinery, appliances, equipment, supplies and necessary tools to be used in the project.		
	Article 7 (a) Exemptions for ten years from income tax and social services tax, the percentage of the exemption depends on the area, 25% if the project is in area A, 50% if in area B, and 75% in area C.		Study from a physical planning point of view.
	Article 7 (b) Additional exemptions shall be given, not exceeding four years if the project has been expanded, developed or modernized with the result of increasing production capacity of one year not less than 25%.		Needs to be accelerated in terms of technology updates.
	Article 24 (a) The non-Jordanian investor may invest in the Kingdom through ownership or partnership or shareholding in accordance with the provisions of the regulation that will be issued for this purpose.	In favor, except for some restrictions on ownership percentages are provided in Regulation No. 39 below.	Allow 100% foreign ownership.
	Article 24 (b) Subject to the provisions of (a), the non- Jordanian investor will be given the same treatment as the Jordanian investor.	In favor, the principal of national treatment is guaranteed except for some restrictions mentioned in Regulation No. 39 below.	
	Article 24 (c) The investor has the right to manage the project in a manner deemed appropriate and through the persons chosen by him for its management.	In favor, if it ensures that the project can bring foreign expertise.	Some of the restrictions in immigration and labor laws have to be lifted.
	Article 25 Expropriation shall be prohibited unless it is in a way of compulsory purchase for the public interest a just	In favor. Political obstacles, such as expropriation do not exist in Jordan. No cases of such have occurred. Stating this	

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	compensation has to be provided.	principal in the law gives more security to investor.	
	Article 26 Investors must keep records of the admitted fixed assets and furnish any information required by the Investment Corporation concerning those assets and authorized employee of the corporation shall have the right of access to the project to check on the accuracy of the information.	Not in favor. This bureaucratic procedure is not efficient time wise and cost wise.	Improve the procedure taking into consideration time and cost.
	Articles 27, 28 If the project was transferred to another owner, the project shall continue to enjoy all exemptions. The investor can also sell the exempted fixed assets on the conditions that duties has to be paid if not sold to another exempted investor.	In favor.	
	Article 30 The investor has the right to remittance of capital, returns, profits and proceeds of sale or liquidation in foreign currency.	In favor.	
	Article 31 Technicians and employees may transfer their salaries and remuneration abroad in accordance with the current legislation.	In favor because foreign labor will be encouraged.	
	Article 33 Investment disputes between the government and the foreign investor shall be settled amicably, if no such agreement was reached within six months, either party may refer to the "International Center For The Settlement Of Investment Disputes", the Kingdom is party to the Agreement on "The Settlement Of Investment Disputes."	In favor because the investors will avoid the slow procedure and the suspects of unfairness of the Jordanian Court.	
Regulation No.	***Article 3***	Not in favor.	Provide for full

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
39/1997 "Non-Jordanians Investment Promotion."	The non- Jordanian investor may not own more than 50% in the following sectors: 1. Construction. 2. Commerce and Commercial Services. 3. Mining.	Provision of IT services will be restricted to 50% ownership.	foreign ownership. Industry and IT service projects may very well be characterized as commercial activity.
	Article 4 Except for the participation in the public shareholding companies and with due observance to the provisions of Article 3, the investment of non-Jordanians may not be less than 50000 Dinars.	Not in favor because any restrictions might discourage useful, despite small, investments.	Omit the restrictions on the size of the investing capital.
Regulation No. 2 /1996 'Investment Areas and Sectors"	The regulation divides Jordan into areas for the purpose of distinction in the tax exemptions. Some of the more important areas are: Ajloun----------75% Ma'an----------75% Aqaba (Quairah)---75% Aqaba (Kazba)-----50%		
	Article 4 The regulation defines industry as all sectors and its sub- sectors including any whole or partial modification to the substance to produce a product different in description, shape, characteristics or formation provided that such activities are conducted inside a relevant establishment in a continuos form.'		
Industrial Estates and Free Zones			
Free Zones Corporation Law no. 32 / 1984	***Article 7*** The Board shall administer and supervise the affairs and activities of the Corporation, and shall exercise all the necessary powers and functions including the following: b. Prepare all plans and programs necessary for expanding the developing of Free Zones. Four. Study Free Zones	It is not clear whether this article includes the services as one of the investments in the Free Zones or not.	This article should be amended to include the Services as one of the investments in the Free Zones, or if the Services are included the article should be clarified to include them explicitly.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	investment applications for establishing industrial, commercial and storage projects.		
	Article 15 Notwithstanding the provisions of any other law or regulations, the Corporation shall have the right to increase the amount of rent of its leased installations and real estates not more than once every three years in such a way as not to exceed the inflation rate or the rates of increase of prices announced by the Central Bank from time to time, taking into consideration the terms of contract in other matters.		
Utilization of the Free Zones Regulation no. 43/1987	***Article 2*** Project: Any commercial or industrial investment project approved in accordance with the provisions of this Regulation	The definition of the project is limited to commercial or manufacturing investments.	The definition should be amended to include the Services.
	Article 3 This regulation shall be applicable to all Free Zones and the Council of Ministers may, upon the recommendation of the Board, order its application on any of the Free Markets.	This article is the path to establish Private Free Zones in the Free Zones although this is not stated directly.	Clearly state the possibility of establishing a Special Free Zone in the Free Zones.
	Article 14 One. Subject to the provisions of the Corporation's Law, manufacturing and factories may be established in the Zone under license issued by the Board in accordance with the instructions laid hereby and after coordination with the Ministry of Trade and Industry. Two. The Board may permit the establishment of any projects or investment enterprises inside the Zones with the aim of covering manufacturing, shipping,	The Services are excluded in this article, and it is not clear if (other commercial activities) include the Services or not.	This article should be amended to include the Services and not just the Manufacturing.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	insurance, storage and any other commercial activities according to the conditions and guarantees it may determine. Three. The processing operation in the Zone shall be conducted under license from the Director including the operations of separating, grading, molding, packaging, packing, mixing, cleaning, greasing, distilling, roasting, pounding, fragmenting, crushing, numbering, and affixing or substituting trade marks. Such operations shall be carried out in the leased premises. The Director may, however, allow such operations in whole or in part in the general warehouses of the Zone or in such places as the Zone may design for this purpose within its premises.		
	Article 15 The industrial investment in the Zone shall be directed towards its exportation abroad. The Minister of Trade and Industry may on recommendation by the Board allow the entry of a percentage of the industrial products of such Zone to the domestic market in the Kingdom.	This article also excludes the Services and is just limited to Industrial investments.	This article should be amended to include the Services, since it is limited to industry and manufacturing.
	Article 18 With due observance to the provisions of Article (15) of the Free Zones Corporation Law, land and constructions pertaining to the Zone shall be leased in accordance with the following bases: One. The lease shall be effected by the Director General's decision upon the recommendation of the Director within the plan approved by the Board. Two. The Board shall	The Director General's authorities are broad, and the rules governing the rent are not transparent. The article also does not state to what type of investments the lands and constructions will be rented.	The rent should not be effected by the General Director's decision, as long as the investor has all the qualifications to rent in the Free Zone. The rent and the amount of the guarantee to be submitted in compensation of the damages

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	prepare lease contract forms and shall determine the conditions thereof including the possibility of the revision of the constructions to the Corporation after the expiry of the lease period. The rent shall be paid in advance for every year and the Director General, by virtue of instructions he issues, shall decide the type of the lessee contrary to the provisions of these Regulations, instructions issued thereunder and provisions of the contract.		should be clear, transparent and reasonable. The article should also state the type of investments the lands and constructions will be rented to. Provide for market driven pricing.
	Article 19 One. The lease period shall be specified in the contract as follows: 1. Thirty years as a maximum for industrial projects. 2. Fifteen years for open spaces as needed for erecting commercial storage buildings. 3. One year for open spaces to be leased for the purpose of storage without erecting any constructions thereon. 4. One year for buildings and constructions erected by the Corporation. Two. In special cases necessitating the reduction of the duration stipulated in items (3) and (4) of this article, the Director General may reduce such duration to the limit he finds appropriate for such cases provided that such limit shall not be less than three months. Notwithstanding the provisions of paragraph (a) of this Article, lease contracts may, after expiry, be renewed annually against a rent to be paid in advance provided that the rent and	According to this article Services are not included and it is limited to certain investments, such as industrial projects. The Director General has broad authorities in paragraph (b), which should be limited.	The Services should be included in paragraph (a). Market driven prices should prevail.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	conditions are mutually specified and agreed upon by the two parties. The lessee shall notify the Director in writing of his intention not to renew the contract two months prior to the expiry of the contract period or, otherwise, the contract shall be considered to be automatically renewed under the conditions laid down by the Board.		
	Article 27 The Board shall issue all instructions necessary for the implementation of the provisions of these Regulations including the following: c. Devising procedures regulating the licensing of industrial, commercial and service enterprises in the Zone and designating the conditions, guarantees, applications and particulars which must be submitted for this purpose.	This paragraph refers to regulating the licensing of Service enterprises when the whole Regulation does not.	Amend all the provisions of the Regulation to include the Services.
Aqaba Free Zone Regulation no. 21/1973	***Article 17*** One. It is permissible to establish factories, collecting factories and other manufacturing investments within the Zone by virtue of a decision by the Council of Ministers upon the recommendation of the Minister of Transport and National Economy. Two. It is permissible by virtue of a decision by the Council of Ministers upon the recommendation of the Ministers of Economy and Finance / Customs, to establish corporations within the Zone to engage in shipping, insurance, storage and other commercial activities, except for financial activities and for providing exported goods to the national consumption.	The factories to be established in the Zone are limited to certain types, basically factories that are engaged in manufacturing. Services are not included.	To amend the provisions of this article to include Services and not to limit the factories to certain types.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	The Council of Ministers shall upon the recommendation of the Ministers of Economy and Finance/ Customs issue the provisions of establishing the corporations in the above-mentioned clause.		
	Article 18 The Director shall decide on whether to approve the rent applications or refuse them without stating the facts.	The Directors authorities in this article are very broad.	Should limit the Directors authorities by not giving him the power to approve or refuse the applications without stating the facts.
	Article 66 Manufacturing projects established within the Zone under the mutual license of the Minister of Transport and the Minister of National Economy might enjoy all or part of the exemptions and facilities of the Investment Promotion Law in force. It is also permissible to implement the provisions of privileges stipulated in the above mentioned law on corporations with commercial characteristics within the Zone, if there was an essential value to the Kingdom's economy.	Limited to manufacturing projects.	Should be amended to include the Services projects.
Jordanian Industrial Estate Corporation Law no. 59/1985.	***Article 6*** The Corporation's objectives are: One. Study, plan, establish and administer all the Industrial Estates in the Kingdom. Two. Promote the establishment of industrial enterprises in the Industrial Estates in different areas of the Kingdom. Three. Promote the movement of existing industrial enterprises to the Industrial Estates. Develop and integrate the industries in the Industrial Estates and surmount all the difficulties.	The objectives concentrate on manufacturing.	Services should be included in the provisions of this article.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	Article 7 The Corporation's authorities are: 5. Approve the establishment of licensed industries within its Estates. 6. Formulate policies of leasing lands and factory buildings established in the Industrial Estates, its selling to the industrial investors and concluding contracts. 7. Provide administrative, financial and technical consultations to the existing manufacturing projects or the projects to be established in the Industrial Estates.	It is not clear whether the industrial enterprises include the Services or not.	The provisions of this article should be clarified or amended to include the Services.
	Article 8 In addition to the exemptions that the manufacturing projects enjoy according to the Investment Promotion law in force or any other law that would replace it, the manufacturing projects established in the Industrial Estates shall also enjoy the following exemptions: One. The new manufacturing projects established in the Industrial Estates shall be exempted from the Income Tax and Social Services Tax for two years starting from the date of commencement of production. Two. The existing projects outside the Industrial Estates that move to the Industrial Estates shall be exempted from the Income Tax and the Social Services Tax for two years starting from the commencement of production in the Industrial Estate. Three. The Council of Ministers upon recommendation from the	The exemption only falls on manufacturing projects, Service projects are excluded.	To amend the provisions of this article according to the Investment Promotion Law so that it would apply on Service projects.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	Minister shall exempt the existing projects in the Industrial Zones that move to the Industrial Estate from the Income Tax and the Social Services Tax from the date of the commencement of its production, by virtue of a decision. Four. The existing manufacturing projects in the Industrial Estate shall be exempted from the Land and Property Tax.		
	Article 17 The Board shall undertake the following: c. Approve the applications for the establishment of factories in the Industrial Estates according to the licenses issued accordingly by the Ministry of Trade and Industry. d. Determine the rent for the lands and buildings within the Industrial Estate -------.	Typical assignments of a Board.	The article should be amended to include that if the applications are complete the Board should accept them, otherwise a reason should be stated.
	Article 30 Notwithstanding any other law or regulation, the Corporation shall have the right to increase the amount of rent on its lands, constructions and properties in such a way as not to exceed in its total 50% per year.	This article is not transparent, and the percentage is high.	The article should be amended by stating that the Corporation shall have the right to increase the amount of rent in reasonable cases and in certain times to reflect market prices.
"Instructions for The Registration of Companies and Factories in the Jordanian Free Zones." for the year 1998	***Article 2*** Activity of the to-be registered Company or Factory: The kind of work to be done by the investor in the Free Zone such as storage, manufacturing, SERVICES, commercial work and others. Company to –be registered: A contract by virtue of which monetary or real shares or a work or all of the above to perform a commercial, industrial or agricultural activity or to	In favor of IT because it includes SERVICES.	

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	perform a SERVICE.		
State Land Administration Law no. 17/1974 and its amendments.	***Article 7*** The leasing of the State Dominion for nonagricultural purposes shall be by a decision of the Minister and upon the recommendation of the Director General, without a Committee or declaration, provided that the other rules and conditions of the leasing be determined in a Regulation to be issued for this purpose.	The law does not include any articles that govern the use of lands for manufacturing, services or any other projects. It covers mainly delegating and leasing the State Dominion for agricultural use only.	The law in general should be amended to include delegating and leasing the State Dominion for purposes other than agriculture. The article in general is not transparent since it is not clear how delegating and leasing the State Dominion for nonagricultural use should take place.
Regulation of Delegating and Leasing of The State Dominion No. 53 of 1974 and its amendments	***Article 2*** The Council of Ministers shall have the right to delegate or lease the State Dominion after counseling with the competent Ministry and upon recommendation of the Higher Committee to manufacturing, mining, tourism or to housing projects and other relevant services, in consideration for quantum meruit or rent determined by the Committee from the prices original estimated value or the prevailing rents.	It is not clear what is meant by relevant services.	Should be amended to specify the projects that can lease or delegate, and should determine the standards for the approvals.
	Article 4 For the purpose of determining the quantum meruit for the State Dominion to be delegated, the land value is estimated according to the prevailing prices that shall be regarded free from any improvements performed by the person to be delegated to.	Improvements performed by the person to be delegated the land are not included in estimating the land value.	Set the rules for the estimation.
	Article 6 For the purpose of leasing the State Dominion for nonagricultural purposes, the amount of rent shall not be less than 8% per year from the determined land value provided that the	The annual rent provided in this article does not include any manufacturing or service project.	The article should be amended to provide for free market pricing.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	annual rent shall not be less than the following: ---- ----------.		
Telecomm-unications			
Communication Law no. 13/1995.	By virtue of this law, a government agency was established "Telecommunication Regulatory Commission" which has the duty of regulating the telecommunication sector and ensure competitiveness.		
	Article 12 Gave the Council of Ministers the right to license any person or entity to work in the field of telecommunications.	The Council shall have the final word.	The licenses should be granted to all who are eligible, so as to eliminate market distortions.
	The Committee will be responsible to set the prices of services when the market is monopolized.	The prices will be set by the Committee if they can not be set by market balance.	Government interference is discouraging in all cases.
Information			
"The Law Of Controlling Visual and Audible Works." Law no. 8/1997.	***Article 3*** No person, entity, shop or exhibit can exhibit any works unless the exhibition is and the work are certified by the board.	Restriction on investment in IT software and programming. Note that there is an intention to lift censorship up from the IT sector.	
	Article 2 Defined the work as: Every visual and/or audible material recorded on tape or on disk or recorded by any other means. It also defined Exhibition of Work as: Exhibiting work in a public place or a shop specialized in exhibiting, selling, leasing, distributing, circulating, preparing or partially or wholly producing works for any of those purposes.		
Retail			
Commercial Agents and Middlemen Law No. 20 of 1974	***Article 4*** Conditions of the Registration of Commercial Agents And Commercial Middlemen: A commercial agent or a	According to the law only Jordanians can practice as Commercial Agents and Middlemen.	This Article should be amended to allow foreign persons and corporations to practice as

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	commercial middleman shall fulfill the following conditions: One. In relation to a natural person: 1. Is Jordanian; 2. Is not less than 20 years of age; 3. Has a commercial house or an office in the Kingdom; 4. Is registered in the commercial register of the Ministry and is a member of a Chamber of Commerce or of a Chamber of Industry. Two. In relation to a partnership, that partnership: 1. Is Jordanian; 2. The majority of its capital is owned by Jordanians. 3. Has an office in the Kingdom and is registered as a member of a Chamber of Commerce or of a Chamber of Industry in the Kingdom. Three. In relation to a corporation: 1. Is Jordanian; 2. The majority of members of its Board of Directors or of its body of executives are Jordanian. Is registered as a member of a Chamber of Commerce or of a Chamber of Industry in the Kingdom.		Commercial Agents and Middlemen in Jordan.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
Immigration			
Immigration	Non-Jordanians working in Jordan need to obtain temporary residency permits. Permit applicants employed in Jordan must prove: One. That they possess educational qualifications not available in Jordan and/or Two. That their employment does not deprive Jordanians of work opportunities. Foreign experts whose work-stay is less than three months are exempted from requirement. Foreign investors may be granted permits only if their projects are approved by the Ministry of Trade and Industry.		Allow foreign workers.
Land			
	All allowances hereunder applicable to non-Arab natural or juridical persons to a reciprocity requirement and need the Council of Minister's approval. The Council of Minister's approval is not required for purchases by Arab nationals, Palestinians and Jordanians unless otherwise specified. Transfer of ownership of real estate falling under section 2 of article 3 of the Jordan-Israel peace treaty shall be only to another Jordanian (lands along the Israeli-Jordanian boarder as defined by the peace treaty). The Council of Minister's approval is needed for transfer of property to non-Jordanians. Non-Jordanians need the Council of Minister's permission to lease any real estate for more than three years consecutively, or in		

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	total. Purchase of real estate by non-Jordanian natural persons is allowed only within cities and villages (municipalities) and their greater basins, or in areas within an existing urban plan. Purchase should be strictly to the extent needed for residential and/or business purposes. Acquired real estate should be developed within five years of purchase or lease. Purchases for speculative purposes are strictly disallowed. <u>Purchase by Juridical entity:</u> Any juridical person registered in Jordan and working in industry, commerce or finance may purchase estate only within cities and villages (municipalities), and strictly in the amount needed for business purposes. Speculative purchases, or purchase for mere acquisition is not allowed. This restriction applies to all juridical persons but purchases by non-Jordanian entities additionally need the council of Minister's approval.		
Trade			
Import and Export Law No.14/1992	***Article 3*** All imported and exported goods must obtain a license for importation or exportation unless such goods are exempted by virtue of this law or any other subsequent regulation.		Eliminate all import licenses and prior approvals if applicable.
	Article 8 The Council of Ministers has the right to confine the importation or exportation of certain goods to the		Eliminate all import licenses and approvals if applicable.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	government.		
	Article 9 The Council has the right to ban importation or exportation of certain goods except upon approval.		Eliminate all import licenses and approvals if applicable.
	Article 12 The Council has the right to issue regulation that states the fees on importation and exportation, regulates the issuance of licenses.	There are no importation fees now on IT products.	
Import and Export Regulation No. 74/1993	***Article 3*** This regulation was issued to determine which goods are exempted from the import and export licenses. It states that all imported and exported goods are exempted except for certain goods such as: Goods imported from or exported to countries that have trade agreements or arrangements with Jordan. Prohibited goods or goods which need approval from other ministries such as the Ministry of Health and the Ministry of Agriculture. Goods that are imported and exported exclusively by the government.	In favor because IT products are exempted from license and there are no importation or exportation fees on them.	
	Article 15 The Council of Ministers has the right to impose the export of license on any goods by virtue of a decision issued by it.	Unpredictable imposition of export license on IT products is possible.	Lift the license of export on IT products by a statutory provision.
The Law For Unifying The Fees And Taxes Levied Upon The Imported And Exported Goods No. 7/1997	This law has cancelled all taxes and fees that were levied on imported goods and which were stated in the Unified Surtax, Unified Deposits, Surtaxes for the year 1969 and the import fees. Therefore, the imported goods and the imported and re-exported goods are subjected only to the Customs Duties or Tariffs.	In favor because now the tariffs will be the only imposed fees instead of having so many fees to be paid. This makes things more transparent to investors.	
Customs Law No. 20/1998	***Article 24*** The origin of goods is the country of production		

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	The source of goods is the country from which the goods are directly imported. Goods produced in a country are those which are made in, or produced, entirely from that country including:		
	Article 25 One. The origin of goods produced in more than one country shall be the country of the last manufacturing stage, provided production there is carried out within a proposed build project set up for the manufacture of a new product. Two. Goods imported from a source other than the country of origin, and which are put for domestic consumption in the source, shall be subject either to the customs, tariffs applicable to the goods from the source or to tariffs applicable to goods from the origin, which ever is higher. Three. Goods which under go additional manufacturing in other than the country of origin, shall be subject either to the tariffs applicable to goods from the country of origin or the tariffs applicable to the country of manufacture, depending on the extent of additional manufacturing and according to the criteria provided in paragraph A of this article.		
	Article 26 One. Imported goods shall be subject to proof of origin. Conditions for proof of origins and for exemptions there from shall be stipulated by a Ministers decision upon the directors'		

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	recommendations. Two. The department may require additional evidence about origin if the authenticity of the certificate of origin presented is put into doubt.		
	Article 27 Rules of preferential origin shall apply pursuant to the treaties between the Kingdom and other parties that provide for preferential treatment.		
	Article 133 (a) Foreign goods shall be allowed to enter the Kingdom under the statutes of pending customs duties and other fees and taxes for processing principally whether the beneficiary is a manufacturer or an exporter, for exportation purposes within a period not exceeding three years. Guarantees shall be submitted to ensure payment of fees and duties in cash or in bank securities or guaranteed undertakings.	In favor of factories inside the Kingdom which are manufacturing for exportation. Never the less, the regime of guarantee that has to be submitted for this purpose is time consuming.	
	Article 134 (b) Goods which are manufactured from materials imported for manufacturing purposes according to the provisions of Article 133 of this law may be put for local consumption upon the Director's approval. The imported materials shall be subject to the customs duties and other fees and taxes at the rates effective at the date of entry of the materials and assessed on the bases of the value of the material at the same date.		
	Calculation of Duties		
	Article 28(a) Customs value of imported goods shall be the transaction value that is		Support the valuation amendment for WTO purposes.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	the price, actually paid or payable for the goods.		
	Article 28 (f)(5) In determining the transaction value, the following costs shall be added to the extent that they are not included in the price actually paid or payable for the imported goods: ---------- ---Royalties and license fees of using the concession right related to the goods being valued that the buyer must pay, either directly or indirectly, as a condition of sale of the goods.		Support the valuation amendment for WTO purposes.
	Customs Procedures/Regulations		
	The entry of imported hardware and software has to be approved by three entities: the Institute of Metrology and Standards, Telecommunication Regulatory Commission and the customs.		
	Article 122 (a) All foreign goods of all kinds and origins may be brought into the Free Zones and moved out to non-customs areas without being subject to import or prohibition restrictions or duties and taxes.	In favor to those factories situated in the Free Zone.	
	Article 122 (b) National goods or those having gained this description by being submitted for local consumption may be admitted to the free zone provided that they shall become subject to import and prohibition restrictions, customs duties and export fees and taxes as well as those imposed for the benefit of the party which runs and invests those zones.		
	Article 123 (a) The goods imported for		

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	local consumption shall not be allowed to be transferred or brought into free zones except by the approval of the Director.		
	Article 128 (a) Goods of foreign origins leaving free zones in their original form and entering into the customs territory shall receive the same treatment as that of foreign goods.		

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
Education			
Regulation No. 25 /1997. "The University of Jordan Teaching Faculty Regulation."	In this Regulation, certain qualifications that are required from a lecturer or any other member of the staff are listed down. However, nothing is mentioned about computer literacy or any knowledge of any form of technology that in these days plays a vital role in the field of education. Never the less, the same regulation in Chapter four it says that the University will promote any work that will be beneficial to it or enhances its progress, yet technology is not mentioned. Also, it is mentioned that there are several repots that a member of the staff must make as a review for persons in charge, which may be time consuming. The presence of computers might accelerate such proceedings. Chapter six says much about the university obtaining latest updates and getting in touch with experts from abroad which might be more efficient through the internet and other forms of technology. Finally, knowledge about technology in specific is becoming such an important thing nowadays therefore; the university must require its members to have such knowledge in order to pass it over to students.		
Instructions Relating To Faculty Members of Jordan University 26/10/1997	In these instructions, much is said about the research library of teaching members. Nothing is said about any form of technology that is available.		
	Article 8 This provision says that researchers do have access	It is optional to use computers and take computer courses.	This should be compulsory.

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
	to computer labs and that computer courses are available.		
Government Procurement			
" Supplies Regulation" no. 32/1993	***Article 12*** If the offered supplies that have been requested for purchase are equal in terms of standards, degree of quality and other conditions and measures requested, the competent purchasing authority should consider the offers as follows: a. Give priority to supplies produced in the Kingdom provided that the prices are calculated on the basis of priority price difference decided by the Council of Ministers.	The Local supplies and suppliers have priority in Government purchases.	Give equal treatment to foreign and local products. However, giving priority to local supplies and suppliers might be useful to encourage investment in IT inside Jordan.
	Article 13 Without prejudice to the provisions of this regulation, the competent purchasing authority can purchase supplies according to the rules of the agreements and protocols commenced between the Kingdom's government and the governments of Arab and foreign companies.	IT products and services can be purchased from the countries that we have agreements and protocols with.	
	Article 14 One. The competent purchasing authority can purchase supplies from outside the Kingdom in one of the following two cases provided that this authority states its reasons for such purchase: 1. If the needed supplies are unavailable in the Kingdom and it is impossible to purchase them through mail. 2. If the competent purchasing authority decided that buying needed supplies directly from an external source would be of benefit to the Government.	Restrictions on buying government supplies including IT products from a foreign supplier.	Restrictions must be lifted.
"Government works Regulation"	***Article 6*** Without prejudice to the	The Competition principle serves the	Give equal treatment to local

LAW	PROVISION	ASSESSMENT	RECOMMENDA-TION
no.71/1986	provisions of this regulation, the following rules should be followed when there is a tender relating to the supply of public works or Government technical services: Two. Application of the competition principle and granting equal chances to different entities capable of performing the work or supplying the service whenever possible. d. Limiting the performance of works to Jordanian Contractors and the provision of technical service to Jordanian consultants if they if they qualify to it and if it is necessary to invite non-Jordanians to submit offers or if the tender was financed by a foreign development loan the rules of Independent Construction Contractors, Law and all the laws related to the Engineers' Union shall be considered in addition to the benefits of circulating foreign capital in the local market.	development of IT sector, however it can't be complete unless you actually allow full competition, that is even with foreign investors.	and foreign investors as long as that the quality and the price are all that matters in tender offers.

Annex A2

ANALYSIS OF JORDAN'S BILATERAL AND MULTILATERAL TRADE AGREEMENTS WITH RESPECT TO INFORMATION TECHNOLOGY

A.1 INTRODUCTION

The following presents details of the assessment of Jordan's bilateral and multilateral trade agreements conducted by an AMIR consultant[2] to support the development of the REACH strategy and action plan.

Jordan enjoys economic privileges with many international markets and economic blocs. Numerous trade protocols are in effect with Arab Countries and Jordan is a party to the Euro-Med Partnership whereby it enjoys free trade zone status with the EU countries. A number of signed agreements impact the IT industry in Jordan. They are summarized in the following paragraphs. A complete listing of the relevant laws and agreements appears in the Attachments. An analysis of the impact of restrictions on the trade of professional services and IT products contained in Jordan's bilateral and multilateral trade agreements and protocols follows.

A.2 MULTILATERAL TRADE AGREEMENTS

Jordan-EU Agreement

Articles 30 through 36 of Chapter 1 of Title III in the Jordan-EU Agreement define the framework of Market Access of services professionals and enterprises. Maritime and aviation companies were excluded from the national treatment rights. Moreover, the EU exempted telecommunications services form these rights. However, there were no clear provisions governing the establishment of IT services companies. The Agreement does not give a clear and final decision on the future of such industry between the EU and Jordan. Due to the fact that both sides expressed interest in excepting certain services sectors from the rights of establishment under the Jordan-EU Agreement, it is legally and administratively impractical to assume that IT services are included in the services permitted by both sides. This restriction exists on both sides.

That said, and due to the fact that EU excepted telecommunication services from the national treatment rights, it is likely that the EU will not open its markets for Jordanian IT companies seeking the right of establishment on the EU side. The EU and Jordan agreed to grant the rights of establishment of branches and subsidiaries on either side with less restriction. However, also it is not how this can apply to the IT sector.

It is clear that Articles 3 through 36 and Articles 37 through 39 do not open the markets on both the Jordanian and EU sides wide open for the supply of services. This leads to the conclusion that the supply of Jordanian IT services to the EU do not enjoy full markets rights in the EU markets. Chapter 2 of Title III, mainly Articles 37 through 39 of Chapter 2 in the EU-Jordan Association Agreement address Cross-border supply of services in the Jordan-EU Association Agreement, which went into effect January 1. 1999 and ends with a free trade area between Jordan and the European community by 2010. Article 37 states that "The Parties

[2] Rasim Abderrahim.

shall use their best endeavors to allow progressively the supply of services by Community or Jordanian companies who are established in the territory of a Party other than that of the person for whom the services are intended, taking into account the development of the services sectors in the Parties." The same Article states the Association Council must make recommendations on implementing the above objective.

Articles 38 and 39 deal with transport issues. To address the above point, it is very evident in the text of the EU-Jordan Association Agreement that their commitment to free trade is in compliance, and is guided by, the GATT, which has become the WTO. Also, in Chapter 2 of Title III, the General Agreement on Trade in Services (GATS) acts as reference standard for the trade in services between the EU and Jordan.

In sum, Jordan will not benefit from the Association Agreement if it does not join the GATS, and if it does, it cannot avoid the signing of commitments that are otherwise under this Association Agreement not excluded. In other words, Jordan cannot discriminate against European services by simply seeking exemptions under the GATS regime.

Although both sides will cooperate in science and technology, there exists nowhere in the Agreement that Jordanian IT products and services can be exported to the EU, and if so that they can benefit from the gradual reduction in customs duties according to the prescribed calendar.

Accordingly, there are restrictions on the supply of professional services and IT from Jordan to the EU. These restrictions can be summarized as follows:

- GATS membership is a must: Full membership in the GATS is necessary
- Local registration inside each European state: Jordan needs to negotiate professional and IT services with each European state. Most European states do no allow Jordanians to establish presence in their countries just because Jordan has an Association Agreement with the EC.
- The "Association Council" needs to study this matter and come with specific recommendations on the trading in professional services and IT.
- IPR issues with Europe remain unresolved.
- Cooperation in science and technology, which is a big item in he Association Agreement, and which is important to Jordan (see below) is important to Jordan, but it will be a standstill until IPR issues are resolved.
- Under the Right of Establishment, Jordan and the EU identified which sectors are restricted or not included in the national treatment rights. Services, especially telecommunications services and IT-related services, are closed to Jordanians inside the EC.
- Also, exports of IT from Jordan to the EU are not mentioned in the Listings agreed upon between both sides.

Articles 55 and 56 of Chapter 2 of Title IV address Jordan's compliance with Intellectual Property Rights (IPR) under the Agreement. Under Article 55, Jordan agreed to enforce the highest international IPR standards with relations to its trading arrangements with the EU countries. Protection of property rights was not only restricted to general intellectual property, but it also covered industrial, trade, and trade-related rights.

While Jordan is in the midst of negotiations to join the WTO, and perhaps sign on the TRIPS Agreement, Jordan is required to comply with the following international conventions under the EU Agreement, (and such commitment(s) are due by or before the end of 2000 or 2001):

- Bern Agreement (Paris Convention of 1971- Copyrights)

- Rome Agreement of 1961 (Protection of Audio Visual Producers and TV and Radio Broadcasting firms)
- Niece Agreement (Geneva Convention of 1977 and its amendments of 1979) (Application of the International Classification of Goods and Services in Trademarks Registration)
- Madrid Agreement (Stockholm of 1967 and its amendments of 1979 - Trademarks Registration Procedures)
- Patent Protection Cooperation Agreement (Washington of 1970 and its amendments of 1979 and 1984 - Immediate Registration of Patents)
- Budapest Agreement (of 1977 and its amendments of 1980 - Protection of inventions of microscopic properties)
- Geneva Agreement (of 1991 - protection of new plants)

With the above framework in place, Jordan is committed to enforcing international IPR within a short period of time to enable its software exporters to enjoy market access in the European Union (under the Jordan-EU Association Agreement) and other countries (under the WTO).

Without commitment to IPR, which is not without cost to other industries (falling short of compliance), Jordan's IT industry will not have a future.

Agreements with Arab Countries

With respect to trade protocols and agreements with Arab Countries, Jordan has signed the executive program of the Arab Free Trade Area Agreement (AFTAA). It has also signed the Pan-Arab Agreements on Investment Promotion among Arab Countries and the Movement of Labor. With regard to the AFTAA, only 14 Arab countries have signed so far. Arab countries, which are known to have non-customs barriers, continue to enforce such restrictions. Some of the Arab countries that are WTO members are enforcing restrictions against the AFTAA members, especially those that are not WTO members. This is a violation of the WTO. WTO members; i.e. UAE, Bahrain, Djibouti, Tunisia, Qatar, Kuwait, Egypt, Morocco, and Mauritania are not in full agreement with the countries that are negotiating their way into the WTO. These countries are: Jordan, Algeria, Saudi Arabia, Sudan, and Oman.* Libya and Lebanon, which are trying o become members of the AFTAA are not reported to be doing anything on the WTO regime. Syria is yet to form a position.

From the above statements, we find that Jordan's exports of information technology products and services will suffer from the following restrictions in Arab markets:

- Information technology may not be includes in the "Engineering Goods" that are under study by the Arab Organization for Industrial Development and Mining. This Organization was asked to make studies on Clothing and Textiles, Engineering Goods, Petrochemicals, and Foodstuffs. These sectors were identified as important Arab sectors, where the Organization was asked to draw "detailed" "rules of origin" for each of these sectors. I have a clear statement that information technology might not be included in the engineering industries if Jordan or any other Arab country does not request such inclusion.

- Some Arab countries may impose restrictions on imports from another Arab countries without having to take approval from the Economic and Social Council of the Arab League.

- Imposing non-customs barriers is allowed.

- Some Arab countries have been allowed to impose "technical barriers", such as tough standards on packing and packaging. This is in violation of the "national treatment" right, but it is allowed.

- Arab countries may seek "Exception" under the AFTAA, especially on keeping duties and taxes.
- Arab countries continue to enforce protection policies of their national industry, and they are allowed to do that under the AFTAA.
- Other Arab countries have proved that a 10% annual reduction may harm their industry by increasing imports. Therefore, they were allowed to seek exemptions.
- Arab countries have not yet agreed on exceptions and exemptions under the AFTAA. This is due to the fact that all Arab countries have bilateral and multilateral arrangements with European countries and other Arab countries.
- Some Arab countries have proved that their internal trade policies should not be harmed. In this manner, these countries have proved that the AFTAA regime will affect their privatization policies.
- Absent "detailed" rules of origin make it difficult for a future Jordanian IT exportable product or service to enter Arab markets.
- Not all of the Arab countries have the same systems of duties and taxes on imports.
- The system of "revaluation" at Customs continue to differ from an Arab country to another.
- Cross Border measures between Arab countries continue to be an unresolved issue.
- Customs Administrators in each Arab country are yet to implement the EDIFACT (E-Commerce) system and to form an Arab Customs Council.

ATTACHMENT 1: INFORMATION TECHNOLOGY AGREEMENT

The Singapore Declaration

At the Ministerial Meeting in Singapore, 28 Members and States or separate customs territories in the process of acceding to the WTO agreed on a Ministerial Declaration on Trade in Information Technology Products (ITA) envisaging elimination of customs duties and other duties and charges on these products by January, 2000.
Implementation

The Singapore Declaration provided that implementation was contingent on expanding participation to cover approximately 90 per cent of world trade in IT products by 1 April 1997. On 26 March 1997, the ITA participants (forty governments) agreed that this criterion had been met and decided to implement the Decision. They also established a Committee on the Expansion of Trade in Information Technology Products to monitor the implementation of the ITA, discuss and approve expansion of product coverage and deal with requests from other countries to join in.

Product Coverage

World trade in IT products is significant - about US$ 500 billion in 1996, or about 10.2 per cent of total merchandise trade. Six main categories of products are covered by the agreement: (1) Computers; (2) Telecom equipment; (3) Semiconductors; (4) Semiconductor manufacturing equipment; (5) Software; and (6) Scientific instruments.

Participants

The 28 participants in Singapore (Australia, Canada, the 15 members of the European Communities, Hong Kong China, Iceland, Indonesia, Japan, Korea, Norway, Chinese Taipei, Singapore, Switzerland, Turkey and the United States) have been joined by 14 other countries (Costa Rica, the Czech Republic, El Salvador, Estonia, Israel, India, Macau, Malaysia, New Zealand, Philippines, Poland, Romania, the Slovak Republic, Thailand). The current 43 participants represent 92.5 per cent of world trade in IT products.

Tariff Reduction Time-Table

The ITA provides for the staging of tariff reductions in four equal installments (25 per cent each time): the first on 1 July 1997 and the other three on 1 January 1998, 1999 and 2000 respectively. Except if otherwise specified in their schedules, participants agreed to eliminate other duties and charges (ODCs) for ITA products by 1 July 1997. Some developing countries have been granted flexibility in staging beyond the year 2000, but not beyond 2005.

**ATTACHMENT 2: ANALYSIS OF THE ARAB FREE TRADE AREA AGREEMENT, CONSOLIDATED PAN-ARAB INVESTMENT AGREEMENT,
AND PAN-ARAB LABOR AGREEMENT**

Summary

Jordan is a signatory of the Three Agreements, but not all of Arab countries are signatories. These Agreements are not binding on all Arab countries.

Jordan is at a disadvantage for not being able to utilize these three Agreements due to the second point (above).

The three Agreements, especially the AFTAA (I hope this is the right name in English), have the foundations for a true infrastructure of Arab, regional, or sub-regional cooperation involving Jordan that might help an emerging "infant" information technology industry.

The Agreements do not seem to conflict with any international agreement. Instead, they draw on the rules and conditions in each international agreement.

Although there might be an "explicit" "call" for "preferential treatment", which may not be accepted by the WTO, this actual provision does not even exist. This is due to the fact that national legislation in each Arab state governing the three aspects; i.e. the movement of labor, investment of and movement of capital, and trading in goods and services, do not take into account harmony or compatibility with the mandates of the three Agreements.

Arab countries are yet to sit and discuss cooperation in services and technology cooperation. (See page three).

The three Agreements provide an umbrella for Jordan's future interests in exporting and importing information technology and information technology-related goods and services.

The disadvantage of the Three Agreements is that the signatory countries are not enforcing the Agreements. Bilateral Protocols overrule such Pan-Arab Agreements.

The Advantage of the Agreements is that they put Jordan in a good position as an attractive center of investment in the IT sector, which is due to the fact that Jordan is an early signatory of such Agreements.

An IT Legislation may simply refer to the three Agreements as framework commitments, but after eliminating provisions that directly or explicitly conflict with WTO rules.

With these three Agreements there is ample room for Jordan to build a sub-regional (manpower training) base for information technology, and perhaps a regional (service outsourcing) base for any technology-intensive industries.

A shortcoming to the IT strategy or legislation would be if Jordan would need to sign bilateral protocols with each Arab country to ensure that the IT sector becomes a successful exporter of goods, services, and manpower to Arab countries.

However, there is a unique advantage to the IT sector under the three Agreements. This would be Jordan's ability to graduate scale-investments to other Arab countries, provided that an "open" IT sector is launched.

Arab Free Trade Area Agreement

The Arab countries' Economic and Social Council, an affiliate of the League of Arab States endorsed the Arab Free Trade Area Agreement (AFTAA), on February 19, 1997. The Agreement went into effect January 1, 1998.

Not all of the Arab countries endorsed the Agreement, and not all those that signed have actually endorsed all of the Agreement's mandates. The AFTAA is in harmony with all international laws, and it is in complete compatibility with the GATT / WTO mandates. The whole Agreement came as a result of the Marrakech Declaration. All WTO rules on trading in goods and services have been taken into account by the engineers of the AFTAA.

The Agreement calls on all member sates to enforce a 10% annual reduction in customs duties and all other taxes and duties of similar effect on imports from other members states as of 1/1/1998. All customs duties and customs and taxes of similar effects should be eliminated by December 31, 2007.

It was not possible to draw a new agreement to implement the AFTAA. Therefore, Arab countries endorsed an "Executive Program" to an old Arab Agreement, called the "Agreement on Facilitating and Developing Trade Exchange among Arab Countries)". The Executive Program is in harmony with the general rules laid by the WTO. Under the Agreement, Arab countries would meet every six months to review progress and would adopt calendars, especially on agriculture and schedules of reductions. Arab states agreed to remove all customs barriers to trade; i.e. all barriers related to quantitative, monetary and administrative restrictions. Also, Arab goods traded under the Program should be granted the "National Treatment" rights with regard to rules of origin, specs (standards), and sanitary and security measures.

The Economic and Social Council set up a "Rules of Origin Committee" which devised the Arab Rules of Origin Program. Dispute Resolution Mechanisms under the Program copy the WTO's mechanisms, and there is an Arab committee charged with settling disputes among Arab states under the Agreement.

Special Treatment: There was an agreement that less developed Arab countries may be granted "preferential" treatment under agreed schedules and specific requests. This remains a theoretical rule.

The Consolidated Agreement on the Investment of Arab Capital in Arab Countries

The Economic Unity Council of the Arab League endorsed on August 29, 1970 an Agreement for the Investment of Arab Capital in Arab Countries and amended it on December 3, 1973. However, the Arab League re-drafted a new consolidated agreement in 1978, which was approved during the Amman Summit in November 1980.

Only 13 Arab countries have agreed the Agreement. The General Principles of the Consolidated Agreement (CA) were:

- Grant Arab capital the rights of "National Treatment" with options for granting additional incentives based on each Arab country's policies.
- Arab countries should take into account the exchange of mutual duties and rights.
- Arab countries agree to provide all the necessary legal, financial, and judicial guarantees, as well as all other facilities and incentives that ensure the encouragement of Arab capital investments in Arab countries.

Facilities and Incentives. The major facilities and incentives provided are:

- Provide stability of capital invested and do not discriminate against new Arab investors taking over from other Arab investors in a licensed investment project. In this context all incentives granted under the original license should be sustained.
- Provide sustained and stable legislative and regulatory coverage to Arab capital in the treatment of Arab investors.
- Identify one central government agency with which the Arab investor would have to interface with from the phase of information inquiry to the phases of licensing, registrations, permits, and other related activities.
- Facilitate efforts by Arab investors to acquire Arab and foreign expertise, (employment of other Arab and foreign professionals) and provide easy entry, residence, and exit permits and procedures to workers and their families.
- Allow national private sector to participate with invested Arab capital.
- Continue the same commitments to all Arab investments. (This item refers to political disputes or conflicts and where an Arab country might withdraw from the Agreement. In such a case, the Arab country would agree to keep the same rights and privileges for the Arab investor until the investor decides to terminate or freeze the investor and at his / her own will.

Guarantees. Agreed Arbitration and Reconciliation Rules would apply between Arab countries. However, Today most Arab countries have signed to the international rules on Arbitration and Reconciliation. Also, parties to a conflict may resort to the Local Court System.

Advantages of the Agreement. The Agreement covers not only investments of Arab capital "in" Arab countries but also the movement of Arab capital among Arab countries. Once the Agreement is endorsed, there would be no need for national legislation to ensure the rights of Arab investors under this agreement. The Agreement mandates that an Arab investor can invest in any sector as if he or she is a national investor of the host Arab country. This was called "Economic Citizenship" in the Agreement. The Agreement established an Arab Investment Court of Law affiliated with the Economic Council of the Arab league.

Criteria for Preferential Treatment. The Agreement allows and calls on Arab countries to grant Arab capital special treatment. However, such "special treatment" would consider the following issues:

- Importance of the project to Pan-Arab economic development.
- Joint Arab projects.
- Rate of Arab participation in the project.
- The extent of "Arab control" of the technology at use in the project.
- Achieve greater Arab control over the "technology" and management" at use in the project.
- Create job opportunities for the nationals of the host country and other Arab nationals, and take into consideration the participation of the host country in the project equity.
- The sector where the investment is being made.

To register the incentives granted to a "preferential project", the designated central government agency of the country where the project is being hosted should send a letter to the Arab Economic and Social Council, or the Arab Commission of the Investment Agreement- which represents the Council under the Agreement, with details about the timeframe and place of such incentives.

Agreement on the Movement of Workforce Among Member States of the Council of Arab Economic Unity

The Council of Economic Unity endorsed the Agreement on January 1, 1969. Not all of the Arab countries endorsed the Agreement. The Agreement calls on member states to facilitate the movement of labor and to pass measures relating to this movement. Each Arab country would name an official body charged with following up on implementing the Agreement, regulating and supervising the movement of labor as well as coordinating with counterpart agencies. Such designated bodies cannot collect charges or fees on their services. Arab countries agreed to exchange information annually pertinent to:

- Work conditions and standards of living.
- Legal rules and measures relating to the departure of workers to work abroad and the entry of workers to work within the host country.
- Facilitation measures the member country provides for such departure and entry activities.
- International commitments already concluded on the movement of labor.
- Number of workforce in demand or that is available classified by professional groupings, qualifications, and expertise.

Under the Agreement, parties to the Agreement agreed to give priority to Arab workers. Also, members states would accept documents and certifications issued by the other member country. Such documents would cover legal and civil status of the worker as well as scientific and professional qualifications.

Arab workers enjoy "National Treatment" rights in the host country, especially in wages, hours of work, weekends, holidays, social security, and other health and educational services. Workers are allowed to transfer (remit) part of their wages to their countries. Each member state would specify the allowable rate of remittance. Member states could conclude bilateral agreements between each two states by signing an agreed bilateral agreement model under this Agreement.

This Agreement (does not) supercede national legislation on labor issues or any international agreements and commitments concluded by the member state, especially if there are other or more benefits granted to workers that are otherwise not included in this Agreement.

The Agreement has an annex, which is a model bilateral agreement.

Annex B

HUMAN RESOURCE DEVELOPMENT STRATEGIES FOR THE GROWTH OF THE INFORMATION TECHNOLOGY INDUSTRY IN JORDAN

B.1 INTRODUCTION

Innovations in telecommunications and information technologies are rapidly changing the requirements of global business development. Jordan is at a crossroad in establishing its capacity and commitment to building a human resources development (HRD) system that will complement an initiative to build an advanced telecommunications infrastructure. Taken together, these efforts will allow Jordan to develop a robust information services industry, capable of participating in technology development efforts in the Middle East and international business markets around the world.

The pages of this report[3] will examine IT-focused human resource development issues and strategies that will affect Jordan as it adopts a national initiative to support IT sector growth. Specifically it will:

- Identify key workforce issues that affect the development of companies in the IT industry.
- Identify future trends and emerging issues relevant to human resource development for the IT sector.
- Present an HRD-IT strategy and action-plan to upgrade the quality and quantity of the Jordanian IT workforce.

A 1999 study by the Information Technology Association of America (ITAA) http://www.itaa.org/workforce/about.htm reports that companies in the IT industry, and their customers, are creating a surge in the need for workers with IT skills. The information technology industry depends upon a sustained supply of well-trained and educated potential employees and requires that employees are constantly refreshed with training that introduces emerging software development and deployment tools. The ITAA study, along with many others conducted around the globe, is predicting an escalation of the worker shortage problem over the next eight to ten years. The IT industry today is dynamic and the proliferation of new technologies will require continual and advanced levels of training for competitiveness.

Jordan's public and private higher education system is currently preparing greater than 1000 IT discipline related graduates per year while approximately 1500 graduates complete IT programs at the nation's community colleges. Employers from across the country indicate that the demand for potential employees with an IT related education does not exceed the supply. Not all graduates are finding employment. Significantly, it appears that unlike most countries that are reporting shortages in the computer educated workforce, Jordan has excess capacity that could be strategically used to attract and build an IT industry.

Jordan's IT companies have also taken a leading role in extending worker skills. They have embraced the challenge of employee development with programs that assist employees in advancing through corporate certification programs from industry leading companies such as Microsoft, Oracle, Novell and Cisco. Private training centers around the nation are also providing services that assist smaller employers and their employees with everything from application level skill development to systems and developer level certification.

[3] This report has been prepared by Bruce Broroson, University of Minnesota, AMIR consultant.

The interest of the Jordanian people in IT related careers are high. In 1998, 8045 students were enrolled in higher education programs in Computer Science, Information Systems, Information Technologies, Computer Engineering, and Telecommunications Engineering. An imbalance is evident when you look at the current size of the IT industry. 1999 statistics from the Amman Chamber of Commerce and the Jordan Computer Society indicate the size of the industry to be 320 firms with 2590 employees. While certainly many graduates may seek employment abroad, the reality is that talent is leaving the country. This talent, if captured by a growing Jordanian IT industry, could be the basis for a strong presence for Jordan in the expanding eCommerce, knowledge management, and outsourcing sectors of the information technology industry and expanding worldwide "information age" economy.

The pages that follow will look at some of the key issues within Jordan's education system, trends within the IT industry that are now presenting opportunities to build IT companies, and a series of strategic questions that could guide the implementation of a plan to position Jordan as a participant and contributor to an industry in the middle of phenomenal growth and expansion.

B.2 Workforce Issues that Affect Information Technology Industry Development

The information technology industry of Jordan will be built by investing in the development of human capital. Unlike many industries that can depend upon infrastructures of fixed assets and traditional collateralized investments, the IT industry is almost exclusively built around the knowledge and skills of the workers that makeup the industry. In building the Jordan IT industry, a strong working relationship between education and the industry is certainly important. What the Jordan IT industry does to proactively build intellectual capacity is also important. The paragraphs below will examine the workforce challenge and how the IT industry of Jordan can react.

A series of research projects have been conducted around the world to acquire information from IT companies that give us a good picture of the skills required by today's information technology professionals. These studies not only serve to help us define where we should place focus on preparing IT professionals that work in the industry already, but they also provide powerful information to the academic programs of higher education. Some of the research has been completed under the guidance of a government initiative; other has simply been a project or corporate research.

In 1996 the Canadian provinces of Newfoundland and Labrador commissioned an extensive Information Technology Human Resource Development Strategy. The study sought to understand their readiness to develop an IT industry, the technology skill gaps of entry level as well as experienced employees, and the quality of their education programs in meeting the needs of technology companies. After months of preparatory secondary research and subcontracting with research organizations, the committee responsible for the project conducted a comprehensive survey (based upon the European Informatics Skills Structure (EISS) and skills definitions from the emerging Internet occupations) with a sample of 250 IT employees and employers from across the region. For the purpose of the study, skills were broken down into two major areas – technical skills and soft skills. The technical skills were defined as specific to individual functions within the industry, while soft skills were defined as transferable that bridge many disciplines and employment situations.

This comprehensive study, which can be located on the Internet at http://www.online.nf.ca/people/, identified the following soft skills demanded by 45% of the regions employers, as most important for employment success in the information technology industry:

Ability to Work Independently	Problem Solving Ability
Ability to Make Decisions	Customer Service
Oral Communications Skills	Interpersonal Skills
Willingness to Participate in Training	Organizational Skills

The study continued by identifying the top five skills demanded by 40% or more of the employers for diploma and undergraduate bachelor degree credentialed workers.

Diploma	Undergraduate
Computer Maintenance/Repair	Business Planning/Analysis
Technical Support	Financial/Budget Analysis
Hardware Support	Human Resource Management
Network/OS Administration	Statistical Analysis
Computer Operation	Data Design/Management

Examining specific computer skill needs, the survey identified the following programming/administration skills as highly sought by employers:

Windows, Windows NT, etc.	C++
Microsoft – All aspects	Novell
Network Building and Maintenance Skills	Oracle
Unix	Internet/Intranet
Word Processing	Visual Basic

In examining the results of this study, 59 recommendations were drafted that proposed the role for industry, the role of educational institutions, the role of information technology professionals, the role of government, and the role of an oversight body that is now called Operation ONLINE. While the recommendations are very specific, in general, they call for greater working relationships between the players in the industry, reforms in education that reflect industry developments, and ambitious marketing efforts to establish the region as a potential home for developing and expanding IT firms.

The United States Department of Commerce Office of Technology Policy in a June 1999 study entitled "THE DIGITAL WORK FORCE: Building Infotech Skills at the Speed of Innovation" (http://www.ta.doc.gov/reports.htm) has addressed concerns about building the human resource capacity of the nation to expand a growing IT industry. The study proposes the following steps to improve timeliness, and value of post-secondary technical education:

- Businesses can play an important role in improving the quality, timeliness, and relevance of technical education programs by participating on university and college advisory boards.
- Businesses and two- and four-year academic institutions should work together to bring professionals with real world experience into the classroom.
- Businesses could lend their knowledge and advice in technical curriculum design, for example by making company technical professionals with state-of-the-art knowledge available to schools for this purpose, and/or to serve as an ongoing source of expertise and advice.
- Colleges and universities need to develop additional ways to determine the types of training needed by employers, such as regular surveys or focus groups with area business leaders, and find faster ways to develop and adapt curriculum and faculty training to keep pace with technological change and business needs.

The study goes on to propose the following steps to improve curricula quality of post-secondary technical education:

- To better prepare students for the job market, certification components could be offered in traditional, four-year computer science/engineering college programs.
- Develop partnerships between science and technology departments and business schools to provide business majors and MBAs with technical skills, and offer people graduating in liberal arts, social science, and other non-IT fields two or three IT/programming courses in the conduct of their college studies.
- Provide some training in commercial practices, tools, and environment during or after students earn their four-year technical degree to prepare them for the commercial environment and to ensure that their technical skills are up-to-date.
- Develop curriculum components in areas such as project management, entrepreneur-ship, human resources management, etc. to prepare technical professionals for non-technical aspects of their jobs.

The November 1998 edition of Computerworld magazine in its report on the Projected Hot Skill Areas in 1999 (http://www.ta.doc.gov/reports.htm) reports the following:

Skill Area	Specific Skill Abilities
Internet Skills	Net development tools, HTML, Java
Tools	Visual Basic, Oracle Developer 2000, Visual C++
Languages:	Cobol, C++, C
Networking	TCP/IP, SNA, IPX
MS/RDMS:	Oracle, Microsoft SQL Server, DB2
Operating Systems	Windows NT, Windows 95,
Unix Internetworking	10Base-T ethernet switching, routing, LAN
Administration	Microsoft NT Server, Novell NetWare,
Ethernet Office/Email/Groupware:	Microsoft Exchange, Lotus Notes, CC Mail, Client Server
Applications	Oracle, Peoplesoft, SAP
System Software & Support	Y2K conversion, help desk, data warehousing/data mining

RHI Consulting's *1999 Salary Guide* (http://www.rhic.com/jobsRHIC/career/resourcesf.htm) provides a detailed US regional perspective on the hottest skills:

New England	networking, software package implementer/installers, network administrators, programmers, Internet/intranet developers
Middle Atlantic	C++ and Java programmers, network administrators, installation and support specialists, systems analysts, Internet/intranet developers
South Atlantic	mid-level networking professionals skilled with LANs, senior-level analysts with Visual Basic programming skills, Internet/intranet developers, software developers
East North Central	IT managers, programmers, PC support technicians, networking professionals (especially those with experience designing and maintaining WANs), Internet/intranet developers
West North Central	networking professionals, Internet/intranet developers, software programmers, help desk support professionals, database architects and administrators
East South Central	software developers, networking professionals, PC technicians, Internet developers, e-mail installation experts, database professionals
West South Central	networking professionals, Internet/intranet developers skilled in C++ and Visual Basic
Mountain	networking professionals, applications developers, UNIX/Windows NT

	systems administrators, business systems analysts, quality assurance professionals
Pacific	networking professionals; Internet professionals; relational database administrators and architects; Oracle and Access database technologists; Visual Basic, C++ and Java programmers

Certainly the skills needed for success are under a careful watch by the IT industry. Business leaders are articulating their needs and sharing with the workforce agencies their need for professionally trained employees. If we can assume the needs in the Jordanian market are similar, how are the Jordanian universities performing as they prepare students for jobs for a dynamic and expanding IT workforce?

Equivalent Course Titles/Topics	Al-Balqa Applied University – 2 year Community College	Amman University – BS Computer Science	Princess Sumaya University - BS Computer Science
Intro to Computer Science		X	X
Intro to Programming			X
Computer Logic			X
Programming – Pascal		X	X
Software Applications – Computer Skills	X	X	
Introduction to the Internet	X		
Creating and Managing Websites	X		
Programming Microsoft Office	X		
C++		X	X
COBOL			X
FORTRAN		X	
ASSEMBLY		X	X
Digital Logic Design		X	X
Data Structures and File Organization	X	X	X
Computer Architectures		X	
Microprocessors		X	
Microcomputer Hardware - Components	X		
Systems Programming		X	
Data Management Systems		X	X
Management Information Systems		X	
Visual Basic	X	X	X
Systems Analysis		X	X
Computer Graphics		X	X
Multimedia Design and Applications	X		
Compiler Construction		X	X
Operating Systems		X	
Software Engineering		X	X
Artificial Intelligence		X	X
System Simulations		X	
Computer Networks	X	X	X
Computer Architectures		X	X
Parallel Computation		X	
Theory of Computations			X

Algorithms analysis and design			**X**
Technical Communications			**X**
Project Management		**X**	**X**
Principles of Accounting		**X**	**X**
Principles of Management		**X**	**X**
Management and Office Automation		**X**	
Management Information Systems		**X**	**X**
Internship – Field Experience	**X**		**X**

Above is a listing of course titles offered in a 2-year program at Al-Balqua Applied University (http://www.bau.edu.jo) and Bachelor of Science degree programs in computer science from Amman University (http://www.amman.edu) and Princess Sumaya University (http://mars.rss.gov.jo/psuct1.html).

Examining the "in demand" computer skills from the information technology industry, the chart below indicates the availability of instruction in the hot skill areas at three sample Jordanian Universities.

Skills requested by IT companies	Available at Al-Balqa Applied University (yes/some/no)	Available at Amman University (yes/some/no)	Available at Princess Sumaya University (yes/some/no)
Project Management	No	Yes	Yes
Internet Development – HTML	Yes	Some	Some
Internet Development – Java	No	No	No
Programming – Visual Basic	Yes	Yes	Yes
Programming – C++	No	Yes	Yes
eCommerce and Web Applications Design	No	No	No
Multi-media Design and Application Integration	Yes	No	No
Internet Standards and Protocols (TCP/IP…)	Some	Some	Some
LAN Administration – UNIX, Linux, and WinNT	Some	Some	Some
Database Developer/Administrator (SQL, Oracle, SAP,…..)	Some	Some	Some
LAN, WAN, Internetworking Integration (Servers, Clients, Ethernet, Hubs, Bridges, Routers)	No	No	No
PC Hardware and Support Services	Yes	No	No

The above chart shows great diversity and specialization. It would seem to indicate that even though there are 8000 students enrolled in IT higher education programs, questions need be asked about Jordan's computer science curriculum. Many of the high demand skills requested by industry are not formally offered by the bachelor degree granting institutions. Why not?

Are the programs meeting the needs of business and industry?

After a number of interviews with Jordanian computer science professors, members of the Jordan Computer Society, and others in the Jordan IT industry, the answer is a qualified "no".

The Al-Balqa Applied University has just completed a major curriculum overhaul and as the charts above indicate, the new requirements are much more reflective of the needs of industry. How this new curriculum is carried out and delivered is yet to be observed. If faculty have been prepared adequately, the program will be welcomed by industry leaders. If the quality of instruction is less than high quality, the needs of industry will again go unmet.

Industry leaders have also developed corporate training initiatives to fill what they see as a skills gap. The use of private training centers and internal self-study certification efforts are common at leading Jordanian IT companies.

Why have the bachelor degree granting computer science degree programs at the university level not met the needs of industry? According to the computer science (CS) faculty we visited with, the answer to the problem does not just simply involve a change in course offerings or content. Some of the issues identified in our interviews include:

- Because of academic rules on consulting, few faculties have relationships with Jordan IT companies. Staying engaged with industry is severely restricted as a result.

- Faculties have spent less than sufficient time in professional development activities. The industry and the tools for the development and deployment of IT solutions are rapidly changing. For faculty to be able to deliver up to date instruction, they need to acquire the skill through a structured learning experience. No evidence of a structure and financial support for faculty development program could be found.

- No industry feedback is built into the operational guidelines of the CS academic programs. The consultant was unable to find a program that uses an industry advisory committee or one that meets on a regular basis with the companies that employ graduating students.

- It is the belief of the CS faculty that, Computer Science as a discipline is clearly defined. Moving away from traditional courses to the emerging applications, driven by the interests of industry, would damage the academic integrity of the programs. Innovating the curriculum is not looked upon positively.

- Few relationships exist with leading hardware or software companies from around the globe. The IT degree programs of Jordan have not sought out training, research, or technology collaborations with companies such as Microsoft http://www.microsoft.com, Oracle http://www.oracle.com, Cisco http://www.cisco.com, IBM http://www/IBM.com, Hewlett Packard http://www.hp.com, Apple http://www.apple.com, or Novell http://www.novell.com. It is common for these companies to have relationships with education in countries around the globe. In Jordan, it is not.

- The availability of hardware and software is a serious impediment to high quality IT education. Current statistics indicate that Jordan's higher education system has 4 computers available for each 100 students. This 4% availability can be directly translated into a serious concern about too few hours of hands-on experience for students.

- A significant concern was expressed in two interviews about the professional training and faculty readiness to assume a leadership role in preparing students for the developing IT industry. Nearly half of the IT faculty have degrees from the Eastern Block, some still fight with instruction in English and many do not see the need for linkages with industry. Still other faculties are prepared with degrees in math and physics but teaching in computer science. While there is nothing wrong with this preparation, many from this group are focused on theoretical issues and take issue with the trend to add applied and specific models to the instructional strategies used to prepare students for an industry.

- There is an expressed concern about salaries and retention. The best and most in touch with industry faculty are in demand and being recruited to industry and out of education. Salaries for IT faculty in Jordan will not retain the best and the brightest to prepare students for the IT workforce unless creative models for compensation are examined.

The executives of Jordan's IT industry are genuinely concerned about IT higher education, but they are not waiting around for changes to take place. Using the corporate education models that are in wide use elsewhere many have:

- Instituted employee recruitment and selection strategies that spend more time measuring technology aptitude as well as personality traits that show creativity and the ability to work in teams on collaborative projects. One company reported that because there is such a great number of applicants for each IT job in Jordan, his firm has been able to add time and detail to the selection process that eventually identifies the very best skills and company fit in an eventual employee.
- Provided the latest in computer hardware and software for employees to support IT work assignments.
- Invested in training resources such as CBT, video, and instructor-led materials that are used internally to prepare employees with an understanding of the technology and tools used to deliver IT solutions.
- Assisted employees in the acquisition of industry certifications by contracting with training firms to deliver IT industry standard courses from companies such as Microsoft, IBM, Oracle, Apple, Novell, and Cisco.

There is every indication that if higher education does not become more responsive to the IT industry, formal corporate training centers, that are squarely focused on embracing the latest hardware, software, and communications trends will substantially expand and assume a greater role in building Jordan's IT industry. In the short-term this is probably a realistic approach to meeting the IT workforce needs. For the long term it simply bypasses the problem. The IT industry will get its strength from the disciplines in higher education and the credibility of the degrees offered as evidence of structured study, research, and the ability to learn through interaction. Jordan's IT industry and higher education institution should together address the problem.

Members of the Jordan Computer Society also expressed concern about the use of computers to support primary and secondary education (K-12). While 90% of the nations private K-12 schools have access to computers, only 25% of government schools are computer enabled. Nationwide statistics indicate a ratio of 2 computers available per 100 students.

No statistics were available to indicate how many schools have local area networks (LAN) to support administrative and instructional activities. We were also unable to determine the availability of either a dial-up or full-time (7 days a week/24 hours a day or 7/24) Internet connection. Technology skills at all ages and for all people will be essential in the very near future, just as the automobile rapidly was assimilated into everyday life, the telephone, the television, the video cassette recorder, and now the computer connected to the Internet will rapidly change how people around the world work, shop, and interact.

Are the curriculums reflective of similar programs around the world? Is the depth and breadth of Jordan's degree options sufficient to provide the variety of career preparation skills needed to fill the occupational diversity of the evolving information technology industry?

Jordan's computer science curriculums can best be characterized as deep in computer and math offerings. Only 20-40% of the course offerings comes from outside the two disciplines. This design is more heavily computer focused than similar academic programs around the globe.

Two leading technology programs in the United States, Carnegie Mellon (http://www.cmu.edu) in Pittsburgh, Pennsylvania and Stanford University (http://www.stanford.edu) of San Francisco, California have fewer computer science courses, but much more broad degree offerings to support industry development in entertainment, education, and telecommunications. Each school has programs focused on emerging convergence technologies that bring together data, audio, graphic presentation, and video. Their programs are responding to industry interests. It should also be noted that both universities have extensive ongoing research initiatives, student scholarships, and faculty development initiatives all funded by leading IT companies.

Similar trends have been noted in the higher education offerings around the world. A comprehensive list of website addresses for computer science degree granting institutions can be found at the web address http://src.doc.ic.ac.uk/bySubject/Computing/UniCompSciDepts.html.

The chart below illustrates the differences in academic approaches in Jordan and the two leading US programs and the University of Dublin, Trinity College in Ireland.

	Range % of curriculum in computer science and math	**Available degree programs**
Jordanian Universities	45-80% Course Listings = Available from each Jordanian University Industry Relationships to Support the Academic Programs= No	Computer Science Computer Engineering Information Systems Information Technologies Telecommunication Engineering
Stanford University http://www.stanford.edu	50-60% Course Listings = http://cse.stanford.edu/class Industry Relationships to Support the Academic Programs = Yes	Computer Science Computer Systems Engineering Symbolic Systems Individually Designed Degree Program
Carnegie Mellon University http://www.cmu.edu	45-60% Course Listings = http://www.cs.cmu.edu/scs/bscs/currreq.html Industry Relationships to Support the Academic Programs = Yes	Computer Science Software Engineering Robotics Human Computer Interaction Language Technologies Knowledge Discovery Entertainment Technologies Computational Finance

University of Dublin, Trinity College –Ireland http://www.tcd.ie	50-70% Course Listings = http://www.cs.tcd.ie/courses Industry Relationships to Support the Academic Programs = Yes	Computer Science Information and Communications Technology Computer Engineering Information Systems Business and Information Technology Multimedia Systems Networks and Distributed Systems Computer Science, Linguistics, and Language

The information technology industry is significantly different than much of what we see as traditional production and service industries - banking, healthcare and manufacturing. It is a dynamic industry in which the only significant characteristic is change and innovation. The industry demands that professionals constantly work to upgrade skills as new products or new versions of market leading products enter the marketplace.

Jordan's higher education system is facing the same concerns and challenges of universities around the world. The challenge is to create an adaptive curriculum that is responsive to business and industry and at the same time preparing students with lifelong learning and thinking skills. Unfortunately, the IT industry is expanding so rapidly that new rules and guidelines need to be considered. Jordan's higher education enrollments and their programs need to establish an advanced level of contact with business and industry and reflect the needs of a critical industry in the long-range economic future of the country.

Closing Comment - Implications of not embracing innovations in education

Many members of the Jordan Computer Society and other companies in the IT community expressed a real concern about the out migration of young and talented IT professionals. Talented computer science graduates often accept entry level employment in Jordan, develop specialized skills on the job, and seek professional and financial advancement abroad, leaving an intellectual gap. This serious "brain drain" will slow the development of an IT industry in Jordan.

Leaving for larger salaries, or to take positions with prestigious industry leading companies, or to simply look for a greater work challenge is nothing new to this industry. It happens worldwide. What is missing now in Jordan is simply opportunity. Once the industry takes the proper steps to attract divisions of leading IT companies that will employ Jordanian IT professionals, Jordanian IT companies mature, and entrepreneurial spin-offs begin to emerge, the strength of the workforce will stay within Jordan, enriching the Jordanian economy.

B.3 HRD Trends and Emerging Issues in the IT Industry

Predicting trends in the IT industry is risky. Just when a clear vision seems to appear, significant innovations emerge and open new ideas and better solutions to business problems. In August of 1999, IT trends all seem pointed towards information convergence. Information is

now much more broadly defined to include not only specific data, but also audio, color, images, and video.

Key Prerequisites for the IT Industry

For convergence to be a reality certain enablers need to be present in the marketplace. Those enablers include:

- **Computer Hardware** – Already, the television has become a computer. We now see them on the market with infrared keyboards, microprocessors, and internal hard disk drives for off-line information storage. All this at a cost of less than $600 in the United States. Soon costs for the new home appliance, available worldwide will be even less, making convergence hardware a commodity.

- **Telecommunications** – Countries and private companies around the globe are rapidly deploying high speed Asynchronous Transfer Mode/Digital Subscriber Lines (ATM/DSL) or two-way cable television modem/router technologies that are allowing information to be available when the device is turned on. No longer is it essential to rewire the "last mile" or into the business or home. These technologies will run on the existing installed copper lines. Cost will eventually settle into a structure similar to what we now pay for telephone and/or/plus cable television, thus making connectivity affordable and convergence a reality. The same wire will carry voice, audio, and video all at the same time.

- **Software** – While the first two ingredients of the IT infrastructure appear to be working toward affordability, the software, that will take advantage of low cost computers and affordable connectivity [(24 hours a day/7 days a week) (7/24)], is still in early development. Significant growth will be seen during the rest of 1999 and through the year 2000 in the following areas:

    1. **Electronic Commerce Software** – The growth of consumer sales alone on the Internet greatly exceeded expert predictions in 1998. In 1999 it continues to accelerate. Looking at a five-year projection, by 2003, the Forester Group http://www.forrester.com/ER/Press/ForrFind/0,1768,0,FF.html predicts that $1.3 trillion in eCommerce transactions will occur on the Internet. Just as the fax machine was rapidly embraced, businesses have already installed email and created a basic website. What they are now asking is "How can we do business with this tool?" The powerful implication associated with this trend is that it will require a unique solution for each business. It requires specialists to use the most current software development tools. Jordan's IT industry has the potential to develop customized business-to-business solutions for corporate clients within the region and around the world.

    2. **Knowledge Management Resource Systems** (http://www.km.org) – Management Information Systems (MIS) today continue to struggle with the age-old problem of how to capture, store and retrieve critical business information. The Web has been a great educator. With its hyperlink design, it offers a user interface that is straightforward and easy to use, yet powerful.

        What we are now finding is that huge volumes of information still exist only on paper. Research volumes and historical documents are not available digitally and not readily available to a broad general population. This scan, digitize, proof, categorize, catalog, and publish task presents a significant opportunity if we examine public information. But imagine the potential at legal, healthcare, banking, engineering and numerous other industries with needs to begin the

process of creating repositories to support their efforts to improve information availability.

The tools to build knowledge management systems have improved dramatically in the past 18 months. The promise of rapidly available information will soon be a reality for some, but for many others it will take time and they will need assistance. The potential for growth and business in the industry is significant.

- **Open Source Software** (http://www.opensource.org) – Less than a year ago it looked as if Microsoft was invincible in the personal computer operating system, local area networking system software and general productivity application software markets. But, 1999 has seen significant corporate growth and adoption of a shareware operating system with roots in Finland called "Linux" http://www.linux.com. Users are now developing every type of software imaginable. Industry leaders such as IBM and Oracle have already released modified versions of their software that will run on Linux.

  As the trend continues, it is worth paying attention to growing opportunities. Linux has the potential to reverse the spiraling trend of higher cost software designed for more powerful computers. Developers are now finding customers eager to make the leap away from Windows to Linux.

  Localization/Arabization of Linux and Linux software as well as the original development presents an outstanding opportunity for the Jordanian IT industry.

- **Outsourcing** http://www.infoserver.com - A trend that started some years ago is now beginning to show maturity as an industry. In the past ten years, many small to medium sized enterprises have discontinued the operation of their own IT departments. Instead they have entered into service agreements and subcontracted IT services with outsourcing organizations. Today these organizations have emerged at the innovative and creative centers of the industry. They frequently help companies through difficult strategic IT decisions and then respond with development and integration plans that very closely meet the needs of business and industry. The keys to participating in this industry are:

  1. Project management talent and experience.
  2. A formal relationship with industry leading hardware/software vendors.
  3. Creative and innovative people able to look at a problem "outside the box".
  4. Skilled integrators and programmers, capable of building, installing and maintaining the solution as prepared for the business client.

With the human resources graduating from Jordan's higher education institution, and an outstanding group of professionals already active in the IT industry, Jordan is ideally positioned to expand as an outsourcing provider for small to large international conglomerate companies.

To take advantage of the emerging trend of the industry, the Jordan IT industry will certainly want to take advantage of some of the lessons learned by others that have prospering IT infrastructures.

Examples of Best Practices in Training and Education

Best Practice #1 - Corporate Training and Certification Programs

Critical to the successful implementation of an IT strategy will be the success of the Jordan IT community in developing a mechanism that will assist the industries managers and employees

in securing a variety of types of certification. Microsoft http://www.microsoft.com, Cisco http://www.cisco.com, Oracle http://www.oracle.com, and Novell http://www.novell.com are four of the leading software and hardware companies with well-established training and certification programs. Each company has facilitated the growth of a worldwide training industry that prepares computer based training (CBT), video, and instructor-led courses for beginning and experienced IT professionals.

These programs have been widely modeled by hardware and software vendors worldwide. Corporate certification establishes credibility. All of the trends listed above will require that IT companies working together can assure each other of a basic level of competence. The certification program does just that.

The Jordan IT community has no option in supporting this practice. It is a door opener. Without certification, companies are locked out of the competitive process of securing IT work.

Best Practice #2 - Nebraska's Applied Information Management Institute
http://www.aimlink.org

The paragraphs that follow are taken from the text of the United States Department of Commerce, Office of Technology Policy publication, "The Digital Workforce – Building Infotech Skills at the Speed of Innovation", published in June of 1999. The Nebraska model gives an example of the implementation of an IT human resources strategy without a formal attachment to education. It is a model that could work well in Jordan with all levels of education, government, and industry focused on building strength for the IT community.

For Omaha, Nebraska, the key to becoming a world communications leader has been the sustained development of a skilled workforce and intellectual infrastructure to go along with the excellent telecommunications infrastructure originally installed for the U.S. Strategic Air Command. In response, the Nebraska business community with full cooperation of the educational and government sectors created the Applied Information Management Institute Services (AIM) in 1992. AIM seeks to support local business growth by focusing on the existing business infrastructure and interpreting business needs to the academic community, resulting in needs-focused changes in the curriculum and structure of educational offerings.

The AIM concept includes providing local technology training, as well as the building of long-term partnerships between educational and business sectors. AIM makes locally available to companies high quality, up-to-date technical training that once required travel to other states. AIM also draws upon Nebraska's universities and colleges as a source of technology education for companies and facilitates cooperation between companies and the academic sector. The result has been that two universities have added a college of information technology, a third has added a college of technology, and a variety of post-secondary schools in Nebraska have added dozens of courses for evening and Saturday classes.

AIM also partners with Nebraska High Schools in developing appropriate technology curricula at all levels, which address emerging communications and technology issues to better prepare student for the workplace. Because the Institute serves on a number of college curriculum advisory committees, it has been able to create pipelines between local high schools and the State's colleges and Universities. The Workforce Initiative for the Next Generation of Students-21st Century (WINGS 21) in Omaha is one such program that brings high school faculty, students and their parents together with local technology-based companies and post-secondary institutions in a unique community partnership built on education and workforce issues.

Specific programs sponsored by AIM include:

- **Cybercamp**: K-12, junior and senior high schools students from the Omaha area participate in a "CyberCamp" to learn World Wide Web development techniques. Students attend instructional sessions on use of the Internet as well as on developing html.

- **Summer Program In Computer Science**: A companion program to Cybercamp, talented high school students are offered the chance to take a course from the University of Nebraska at Omaha's College of Information Science and Technology. Students can take an introductory, college-level course exploring the fundamentals of computer programming and object-oriented design methodology using the visual C++ programming language. Upon satisfactory completion of the program, students will have earned four UN-Omaha college semester credits in computer science, which will generally be transferable to most colleges in the country.

- **CareerLink**: The AIM Institute sponsors the CareerLink website which connects businesses from all over the state with prospective employees based on their specific needs. Applicants can fill out job applications, which are electronically directed toward an employer.

- **Internship Program**: coordination of student and faculty internships that provide applied business experience, and furnishing firms with new recruiting tools and access to skilled people.

- **Online Mentoring Program**: Participating students are matched up with business professionals who make themselves available at least twice a week, and serves as a mentor for a one-month period. During that period students acquire increased career awareness, greater identification with information technology professionals, and a better understanding of how skills are applied in career fields.

Best Practice #3 - The Corporate Schools of the Indian Institute of Information Technology (IIIT) in Hyberabad, India http://www.iiit.net

Operational from academic year 1998-99, The Indian Institute for Information Technology is an industry driven, "Center of Excellence" in IT education, training and research. Since opening, the IBM School of Enterprise Wide Computing http://www.ibm.com, the Microsoft School of Software Technology http://www.microsoft.com, the Metamor School of Excellence in Software Development Methodologies http://www.metamor.com, the Oracle School of Advance Software Technology http://www.oracle.com, and the Satyam School of Applied Information Systems http://www.satyam.com have all opened corporate schools.

While the Institute has become fully functional only in the past year, the potential is significant. Indian academic leaders have been able to attract strong corporate representation and investment. It will be important to observe the results of this initiative in the years ahead. If it finds great success, expect corporations and academic institutions around the world to model similar programs.

Best Practice #4 - The IBM Global Campus for Higher Education – http://www.hied.ibm.com

In the fall of 1993, the University of Minnesota, Crookston (http://www.crk.umn.edu) campus became the first baccalaureate degree granting higher education institution to fully implement a technology plan that provided notebook computers for all faculty and all students. In addition, UMC wired 85% of its classroom seats, all student housing, and most gathering points on campus with network connections. Students and faculty were also provided with dial-in access to the network and Internet so that they could continue their studies and inquiry while

off campus. The plan was innovative, but risky. It required a significant investment in both human and technical resources.

Since its inception, the initiative has been widely published in higher education journals, the subject of an EDUCOM study on "Universal Access in Higher Education" (http://www.educause.edu/nlii/keydocs/csu.comps.4.kids.html). It has also been widely replicated in the United States, Canada and around the world. Current reports indicate that as many as 250 public and private universities have some form of mobile or notebook enabled learning environment. Programs of which there may be opportunities for Jordan university collaborations include:

- The Instituto Technologico y de Estudios Superiores de Monterrey (ITESM) Mexico http://www.sistema.itesm.mx/english,
- University of Hong Kong http://www.hku.hk,
- Korean Open University http://www.knou.ac.kr
- Acadia University in Nova Scotia, Canada http://www.acadiau.ca
- Wake Forest University in North Carolina http://www.wakeforest.edu
- and the University of Minnesota, Crookston http://www.crk.umn.edu

IBM has added to the strength of the "Thinkpad University" model by adding technologies and consulting services that embrace the building of a powerful infrastructure to support instruction. IBM now has a substantial installed base of best practice institutions using their technology and is exhibiting a willingness to partner with institutions that are seeking to innovate and connect with business and industry.

Educational institutions that have adopted strategies coming from IBM's Global Campus model report enrollment increases with the ability to attract high ability students, greater student satisfaction with their education, faculty turnover that in fact is in some cases a positive development as institutions seek to improve quality, and greater interaction with business and industry.

Best Practice #5 – The Implementation of Instructional Technology and Distance Learning Centers http://www.horizon.unc.edu/TS/development/1998-09.asp

To support the integration of technology into education, from elementary to secondary and higher education new "support service centers" are rapidly being deployed. Instructional technology centers make available professional assistance to educators in the following ways:

- Providing comprehensive training opportunities through courses, seminars, and workshops.
- Making hardware and software available to educators, so that they may experience and use technology, to facilitate learning.
- Providing personal one-to-one assistance to individual teachers, or instructional teams working to update teaching strategies for a course topic, courses as a whole, or through an entire curriculum.

Often, instructional technology center initiatives lead to the development of "distance learning" centers. Models have been built by Athabasca University in rural Alberta, Canada (http://www.athabascau.ca), the Open University of Great Britain (http://www.open.ac.uk/frames.html), and The National Universities Degree Consortium in the United States (http://www.sc.edu/deis/NUDC). Responsiveness to changing business and industry needs has generally been the most significant indicator of a successful delivery. A comprehensive website that catalogs and references work that is underway in distance education can be found at http://www.cisnet.com/~cattales/Deducation.html.

Discussions and innovations will continue to define online, "anytime, anyplace" instruction. With the trends towards convergence in technology devices and improving software platforms, the market for learning services will increase substantially over the coming decade.

B.4 HRD Strategies for the Strengthening of the Jordanian IT Workforce

As the REACH Initiative for Building an Information Technology Industry in Jordan moves forward, the challenges to develop a robust telecommunications infrastructure and a high performance workforce must go hand in hand. Work on improving telecommunication capacities is well underway within the Jordanian government. The recommendations identified below assume that Jordan will be able to meet the connectivity needs of business and will grow into an IT industry that is robust, job creating, and economically dynamic.

Each of the nine recommendations listed below are essential to the development of the industry. Inaction will cause existing opportunities for a number of high quality IT firms to be severely limited. It will result in few entrepreneurial activities, and few international information technology-leading companies will locate in Jordan. Carrying out the actions identified below will energize and reshape the economic opportunities of the "information age".

Human Resource Recommendations

1. Center of Excellence. The Jordanian IT Industry should create a "Center of Excellence" that delivers instruction and certification from Industry leading companies. Today, some of those companies include: Microsoft, IBM, Cisco, Novell, Adobe, Macromedia, Oracle, and Red Hat.

The center should be structured so that it can provide updating and training services to industry and to educators. Investing in professional skill development is essential for a long-run positive impact on the development of an IT industry.

The center would ideally take the best from the lessons learned in the Nebraska project which partners with business, industry and education; the Indian Institute of Information Technology which exhibits a strong relationship with industry; and the IBM Global Campus project which puts notebook computers in the hands of a learner and focuses on an environment where the learner is involved as a member of project teams and online connected to the Internet for the purpose of gathering information and looking for high quality innovative solutions to business problems.

Time to Implement: This recommendation should be carried out over a functional plan of six months.

Sample tasks that may need to be completed within the first two months include:

- Prospectus prepared to market the center to leading international and domestic technology companies.
- Advisory committee formed with the goal of facilitating instruction, and providing feedback to higher education concerns on the quality and relevancy of instruction.
- The development of a "high priority" information technology/computer science curriculum. This task will take time to examine Jordan's existing computer science programs, to look at innovative IT programs around the world, and build a program of study that builds on existing strengths and integrates emerging trends.

- Visits to higher education institutions to identify potential faculty to support an innovation initiative and also to examine the training needs of academic staff.
- In addition to the above, a physical location for the center will need to be established.

Potential USAID Involvement: Extensive – The planning process, staffing, and the physical plant all will require investment.

2. Standards and Certification. Resources (time and finance) should be committed to build the Jordan IT industry base of corporate (i.e. - ISO 9000) and individual (i.e. - MCSE) certifications, in order to demonstrate a consistent and globally accepted level of quality assurance for IT industry customers. Certification is the entry point to many IT development opportunities. It establishes a level of commitment and capacity to serve that is essential to building a business relationship. Appendices A and B identify a sampling of certifications and accreditations commonly available from industry associations and corporations. Most major IT associations and leading companies are expanding their certification efforts and looking for business partners willing to make the investment requirements necessary to get certified and then to deliver high quality service.

Jordanian companies have already demonstrated a commitment and an understanding of the value of certification. Specialized enterprises that train for certifications exist and in-house training to prepare specifically for certification is now commonplace.

Time to Implement: The implementation of this recommendation is already underway. Expanded activity and support is needed to assure that emerging trends are included for this program to sustain itself. Certification readiness that will result in the development of business relationships on an international scale, for the Jordan IT community, could take as long as two years.

Potential USAID Involvement: Moderate – This initiative can be led by the "Center of Excellence" as envisioned in recommendation #1. It would makeup a significant portion of the centers initial program of work. The industry itself must also embrace accreditation and work towards meeting ISO guidelines. Business relationships will depend upon the successful implementation of plans to increase the number of employees and companies with certifications and accreditations.

3. Faculty-IT Industry Professional Exchange Programs. A comprehensive faculty/professional exchange programs should be developed, that can be used to nurture a strong education/industry working relationship. Relationships between the IT industry and education in Jordan are insignificant. Because of current consulting guidelines and the general feeling in education of academic separation, IT industry leaders have not sought to build interdependencies that could lead to business benefits and education responsiveness. An exchange program that puts educators to work with real customers and real problems will eventually translate to a more powerfully business connected faculty team for an institution.

IT industry companies that participate in a faculty exchange will have the opportunity to observe the classroom performance and social interaction of a great number of students. They will be able to make judgments and to have a solid picture of students that would be ideal hires. The industry faculty replacements will also get a chance to experience the politics and interactions of the higher education academic culture and better understand how the IT industry can be of assistance to the higher education system.

Time to Implement: This strategy will take some time to implement. Higher education institutions must be legally and physically willing to participate. Jordan's IT community must also take time to determine which of their staff are capable of responsibly carrying out the task of delivering to the demands of education.

Potential USAID Involvement: Moderate. This public/private relationship needs to evolve from two parties with an agreed upon mutual interest. A win-win relationship is possible here. USAID could provide funding for pilots that explore the development of exchange guidelines, and they could support the potential underwriting of salary differentials of IT professionals and educators as they move laterally to understand each others job.

4. Internship Programs. The IT industry should provide enhanced internship/work opportunities for students in order that, upon graduation, they have immediate practical value to the Information Technology industry and also possess advanced, experience-based skills. Students today have rapidly become independent learners eager to acquire knowledge and skills that translate into an experience that closely relates to work after graduation. Many IT firms in Jordan still look at an internship as work agreement in which they provide an unpaid learning environment. Where internships work best, students are paid for their work at a minimum level, but still paid. They also have a structured set of expectations that are agreed to by the educational institution, the employer, and the intern. This structure leads to a higher degree of productivity from the student and a greater commitment from the IT firm to continue offering a cooperative learning environment.

Time to Implement: This recommendation could be enacted very rapidly. Once the document to establish a model of the student/employer working relationship is agreed upon, it can serve as a focal point for building a positive work experience. The end result of a quality internship are students that will be better prepared to enter the workforce with higher levels of preparation.

Potential USAID Involvement: Limited. This initiative must be let by industry in close collaboration with education. Two of the three Jordanian Universities referenced in this paper require internships for their students. Most are non-paid. By simply changing and improving the structure of the experience, this recommendation can be implemented without much delay.

5. Improvements to Curriculums. The Jordanian Government in collaboration with the IT industry should develop information technology goals that will provide guidance for primary, secondary and higher education across the curriculum, in all disciplines of study. Computer and information technologies are rapidly changing and forever altering today's learning environments. Tools for effectively connecting students with quality learning materials are improving each day. The power of the rich multimedia CD technology, the World Wide Web and simple productivity software have changed the way students and teachers interact. Working together, the Jordanian education community, government an leading IT companies should look at how computer literacy can best be integrated into and throughout the learning of all disciplines from math and science to language, art and history. Internationally a great deal of work has been completed on similar initiatives. In most cases the development of a comprehensive roadmap has led to increased investments in the training of educators, computers, and Internet infrastructures and resulted in growth within IT and associated industries.

Time to Implement: The process of defining technology related goals could be completed in as short a timeframe as three months. The Canadian study in Newfoundland, which only looked at the IT industry and education but could be easily broadened, is a good example of how industry standards can be used to help clearly define specific learning expectations. Creating a plan that will enable the Jordanian education system and executing the plan could take as long as two to three years. It will require significant investment in hardware and teacher training. Please note that only 25% of all public elementary schools have a computer and only 2 to 4 computers are available to 100 students depending upon the system. The current availability of computers in education is very limited. For Jordan to enter the "information age" this will need to change.

Potential USAID Involvement: Extensive. The actions called for in this recommendation require an extensive planning effort and significant expenditures to carry out the actions needed to build computer literacy across the curriculum.

6. Expansion of Access to Computer Resources. The number of computer resources available to facilitate instruction at all levels, from elementary to higher education, should be expanded. As referenced above, hardware investments are minimal in Jordanian education. That needs to change. As a pilot to examine the potential of high availability, the Jordanian education system and government should consider a pilot institution implementing an IBM Global Campus design. This design provides notebook computers to students, wires the infrastructure of the campus environment for network and Internet services, and provides support for faculty development efforts. With this design now gaining international acceptance, Jordan could easily partner with an institution that has successfully implemented a "Global Campus" system and twin the learning setting in Jordan. A number of these relationships have already occurred between the early innovating institutions that developed the "Thinkpad University" design and those that have followed in the past three years.

On a more general implementation, simply making computers more available will go a long way to enable the learning environment. This recommendation calls for a simple investment but requires substantial financial commitment.

Time to Implement: The execution of this recommendation can begin gradually and build as the financial resources become available. To fully reach the goal of computer literacy as defined in a previous recommendation, this action may require two to five years of focused effort. It will then require that education and government commit to a program of upgrading and replacement that retires computers on a two to four year schedule. The useful life of a computer is not always dependent upon its functional operation. Often they will not wear-out before replacement is required. The development of greater capacity software and business use of that software often will influence the need to upgrade and replace hardware.

Potential USAID Involvement: Extensive – The pilot of an IBM Global "Thinkpad" program within both a secondary and a higher education institutions would provide an excellent learning platform to evaluate. What are the unique challenges in the program for the Jordanian cultural environment? Will students embrace the idea of independent learning that is integral to the success of such a program? Will faculty develop the computer skills and change their teaching methodologies to embrace technology-facilitated instruction? These and many more questions could makeup a quality USAID effort.

7. Enhancement of Professional Skills of Educators. A professional skills enhancement program for educators should be developed, that will upgrade computer and Internet skills for the purpose of integrating greater use of technology for instruction. Individual Jordanian educational institutions could initially carry out this recommendation as they work towards improving their own learning environment. The Al-Balqa Applied University has recently made significant modifications to its curriculum and is now helping faculty upgrade skills. This effort should not be a one-time effort. It should lead to an extended program that embraces innovation, updates faculty on the implications of change, and helps build the technology skills of teachers over an extended period of time.

The concept of an "Instruction Technology Center (ITC)" is well defined worldwide. It puts a structure in place to facilitate the implementation of an IT enabled learning system. The key to a successful implementation of an ITC program in Jordan will be a carefully crafted program of work. Goals, which focus on meeting the needs of faculty and students will translate into the type of learning environment that are responsive and motivational. The existence of an ITC accelerates the process of a successful information technology implementation and places the

tools of innovation in the hands of faculty. It provides an educational boost to the development of an IT industry by building the skills of teachers.

Time to Implement: The initial implementation of an instructional technology center could take place as a program of the "Center of Excellence" in the proposed technology park, or it could be a program of a leading educational institution. Again, international models do exist and the opportunity to twin a developed program is high. A pilot program could be started within three months. It will take three to five years to fully implement a resource capable of serving all of elementary, secondary and higher education.

Potential USAID Involvement: Moderate. The initial task of Jordanian education leaders will be in establishing links to successful programs and developing a strategy to transfer the policies, procedures, services, and infrastructure components to a Jordanian facility. USAID could potentially participate in this pilot project initiative.

8. Relationships with Leading IT Companies. Cooperative relationships with leading international technology companies should be established. The Corporate Schools of the Indian Institute of Information Technology (IIIT) are a great example of the power of business relationships. This strategy has the affect of attracting foreign investment and connecting the learning environment with rich instructional materials developed by the industry leaders themselves. The relationship does not have to be as extensive as the IIIT design. In numerous IT educational programs, these companies are simply making software, hardware, and learning materials available to the institutions at no or little cost. The strength of the relationship comes from communications. Keeping abreast of innovations and upcoming developments is simplified when a cooperative relationship has been established. Jordan's higher education programs in computer science, software and telecommunications engineering, and information systems will find corporate training resources eager to participate in a mutually beneficial education process.

Time to Implement: Jordan's leading educational institutions could establish working relationships within a short period of time. Over a period of three months they could determine which cooperative relationships are of greatest value, initiate discussions and sign agreements. For some of the more influential companies, such as Microsoft, a negotiated relationship that spans a number of educational institutions may be desirable. Overall, the formal process of developing a comprehensive set of relationships could take from one to three years.

Potential USAID Involvement: Limited. This is an initiative that must come from higher education with the assistance of IT leading companies in Jordan. The phase in business that says, "People do business with people that they know" is important here. Building a common understanding and personal acquaintances must come from those directly involved in the development of Jordan's IT industry.

9. IT Industry Advisory Committees. Advisory committees with industry need to be formed to assure that educators receive regular feedback on industry trends and human resource needs. The initial process of developing the IT industry will certainly involve a great deal of interaction between education, government, and leading IT companies. Once the initial push of the development process is completed, the challenge of sustainability begins. A strategy widely used by United States universities is the creation of industry based advisory committees. These committees meet to provide regular feedback on the relevancy of program instructional strategies and to assist in identifying trends that need to be added or subtracted from a curriculum. While not binding on the degree programs, they certainly provoke a great deal of thought and discussion. Advisory committee members are also substantial contributors to program growth because of the contacts and business relationships that can be made available to university faculty, because of the support for internship and faculty exchange

programs that they often use, and because of the financial support that they deliver to help the programs be responsive to industry needs.

Time to Implement: Again, this recommendation can be implemented with relative ease in a short period of time. There is one word of caution. The makeup of the committee needs to be carefully considered. The members need to makeup a cross section of industry niches and members must be able to represent a wide variety of industry interests in addition to expressing concerns from their own enterprises. Initial committees memberships usually go though a time of transition until a strong and representative body emerges. Typically this development process will take place over the course of a two to three year period of time.

Potential USAID Involvement: Limited. Higher education degree programs and the faculty in those programs must see the value in an industry feedback committee. USAID could potentially assist in the development of guidelines for the use of advisory committees but a significant investment in money or time may not be necessary.

Conclusion

Jordan has a significant opportunity to build a robust information technology industry. One that will attract industry-leading companies, foreign investment, and lead to expanded export opportunities to strengthen the Jordanian economy. The pages of this report were meant to stimulate thought, suggest a strong potential for the future of the Jordan IT industry, and to suggest actions that can accelerate the industry development process. One word of caution – this is a rapidly changing industry. What you see in this report is reflective of the industry and the technology trends of August 1999. Just around the corner is the introduction of a new high powered operating system from Microsoft, the launching of a low satellite system that will enable high speed telecommunications services at new price points, and a new generation application software that is voice and handwriting enabled.

Taking the conservative path of following the industry trends rather than participating in the innovation process has great risk. This industry has been matured by a relative small number of leading companies, but frequently innovated by small entrepreneurial enterprises with the vision to define business problems and to create IT solutions to address those problems. Jordan's existing IT community is already exhibiting innovation, but the opportunities that lie ahead are even more outstanding today than they have been since the introduction of the personal computer twenty-five years ago.

The human resource suggestions listed in this report present a beginning framework. A comprehensive strategic and operational plan that pulls all the critical components of a strong industry development initiative is necessary. This industry will develop only if a strong and visionary leadership is identified and a carefully crafted plan is executed as rapidly as possible.

The opportunities are great but time is fleeting. The Jordan Computer Society should press for a coordinated effort that brings education, government and industry together as soon as possible.

Attachment A - Personal Certifications and Equivalencies
In Information Technology and Information Management
North America and European Union

Source – "Information Technology – Closing the Human Resources Gap in Newfoundland and Labrador" - Final Report, May 1998

Designation / Certification	Granting Agency	Home Country	Certification Criteria
Non-Vendor/Association Granted Certifications			
ISP Information Systems Professional	Canadian Information Processing Society (CIPS)	Canada	Education (CCP is accepted) plus experience
ITP Information Technology Professional	Software Human Resources Council	Canada	Completion of an accredited 12 month program (nine months academic, 3 months co-op)
FBCS Fellow Member of the British Computer Society	British Computer Society (BCS)	Britain	Examination, academic credentials, plus experience
MBCS Member of the British Computer Society	British Computer Society (BCS)	Britain	Examination, academic credentials, plus experience
Associate Member of the British Computer Society	British Computer Society (BCS)	Britain	Academic credentials plus experience
CEng Chartered Engineer (BCS)	British Computer Society (BCS)	Britain	Equivalent of an accredited honors university degree
IEng Incorporated Engineer (BCS)	British Computer Society (BCS)	Britain	Equivalent of an accredited HND program (Higher National Diploma)
FICS Fellow of the Irish Computer Society (ICS)	Irish Computer Society (ICS)	Ireland	Experience and contribution to industry & profession; no examination.
MICS Member of the Irish Computer Society	Irish Computer Society (ICS)	Ireland	Recognized degree or Diploma in Computing/IT plus

Designation / Certification	Granting Agency	Home Country	Certification Criteria
			experience - no examination
Associate	Irish Computer Society (ICS)	Ireland	Recognized degree or Diploma in Computing/IT
RIS Registered Informatics Scientist	Dutch Association of Informatics Scientists (VRI)	The Netherlands	Recognized IT degree, four years IT experience, and endorsement from two VRI members
CCP Certified Computing Professional **CDP** - Certificate in Data Processing **CCP** - Certified Computer Programmer **CSP** - Certified Systems Professional	Institute for Certification of Computing Professionals (ICCP)	United States	Examination plus a minimum of two years experience
ACP Associate Computing Professional	Institute for Certification of Computing Professionals (ICCP)	United States	Examination
CISSP Certified Information Systems Security Professional	International Information Systems Security Certification Consortium - (ISC)2	United States	Examination plus experience
Some Vendor-Specific/Proprietary Certifications			
CNE Certified Network Engineer **ECNE** Enterprise Certified Network Engineer	Novell Inc.	United States	Examination
Apple CSE Apple Certified Server Engineer	Apple Inc.	Unites States	Examination

Designation / Certification	Granting Agency	Home Country	Certification Criteria
MCSE Microsoft Certified System Engineer **MCSD** Microsoft Certified Solution Developer **MCIS** Microsoft Certified Internet Specialist **MCPS** Microsoft Certified Product Specialist **MCT** Microsoft Certified Trainer	Microsoft Inc.	United States	Examination

Attachment B – Accreditations in Business,
Information Technology, and Information Management
North America and European Union

Source – "Information Technology – Closing the Human Resources Gap in Newfoundland and Labrador" - Final Report, May 1998

Accreditation	Accrediting Body	Description - Details
ISO 9000	Various domestic organizations known as "registrars" which are accredited by an ISO) affiliated national body In Canada, registrars are accredited by the Standards Council of Canada (CSA) In the U.S., registrars are accredited by ANSI (American National Standards Institute)	**General Description** The ISO 9000 series is a set of five universal standards for a Quality Assurance System developed by the International Organization for Standardization with the support and direct participation of key national bodies from around the world, such as the Standards Council of Canada. These standards embody comprehensive quality management concepts and guidance, along with a number of models for external quality assurance requirements. The number 9000 is "reserved" for any standards relating to quality management. The ISO 9000 series is comprised of ISO 9000, 9001, 9002, 9003, and 9004. **ISO 9000: Quality Management and Quality Assurance - Guidelines for Selection and Use** ISO 9000 is a guide to the use of the other standards in the series. The Guidelines define selected quality terms and explain quality concepts. They also provide guidance for the tailoring of quality assurance models for specific contractual requirements. **ISO 9001: Quality Systems - Model for Quality Assurance in Design/Development, Production, Installation and Servicing** ISO 9001 is the most comprehensive of the standards and encompasses 9002 and 9003. The ISO 9001 standard is aimed at demonstrating conformance to specified requirements through several stages. It is mainly applicable to organizations involved in product design and is made up of 20 quality systems elements. **ISO 9002: Quality Systems - Model for Quality Assurance in Production and Installation** ISO 9002 is used in situations where the design of the product is fixed, and there exists a need for

Accreditation	Accrediting Body	Description - Details
		assurance of conformance to production and installation specifications. This standard is made up of 18 elements and three of these are less stringent than ISO 9001. **ISO 9003: Quality Systems - Model for Quality Assurance in Final Inspection and Test** ISO 9003 is the least comprehensive of these three standards and is to be used in situations where assurance of conformance to specifications is required at the final inspection and testing phase. ISO 9003 comprises 12 quality system elements that are less significant than ISO 9001 and/or ISO 9002. **ISO 9004: Quality Management and Quality System Elements – Guidelines** ISO 9004 assists companies in the implementation of quality systems. This standard is geared towards internal quality management practices, as opposed to external parties, as is the case with the above three. ISO 9004 emphasizes functional responsibilities, the importance of risk and benefit assessment, and customer satisfaction.
		ISO 9003: Quality Systems - Model for Quality Assurance in Final Inspection and Test ISO 9003 is the least comprehensive of these three standards and is used in situations where assurance of conformance to specifications is required at the final inspection and testing phase. ISO 9003 comprises 12 quality system elements that are less significant than ISO 9001 and/or ISO 9002. **ISO 9004: Quality Management and Quality System Elements - Guidelines** ISO 9004 assists companies in the implementation of quality systems. This standard is geared towards internal quality management practices, as opposed to external parties, as is the case with the above. ISO 9004 emphasizes functional responsibilities, the importance of risk and benefit assessment, and customer satisfaction. The four generic product categories around which the ISO standards are developed are: 1) hardware,

Accreditation	Accrediting Body	Description - Details
		2) software, 3) processing materials, and 4) services. The term hardware refers to "a tangible, discrete product with distinctive form", and software refers to "an intellectual creation consisting of information expressed through supporting medium". **Application in an Information Technology Context** The ISO series were primarily developed for, and are most prevalent in, manufacturing, assembly, and testing environments. However, there are elements of the ISO series, particularly those contained in the 9001 and 9002 series, which apply to systems and software development environments and which are forming the bases for ISO certification. **Certification/Registration Criteria** The organization seeking certification must demonstrate compliance with all relevant ISO requirements.
		Registration Process The first step in quality system registration is an assessment of the organization's quality manual against the appropriate ISO 9000 requirements. This is followed by an on-site audit of the organization's quality system and actual practices against the requirements stated in the manual. The registration process normally lasts between three and eighteen months. During this time period, the organization may need to make adjustments in areas where it does not measure up to the relevant ISO requirements. If the above process is successful, the company receives a certificate of registration, which is valid for a specified time period (usually for three years). At the end of the registration period, there is a re-audit, and compliance audits are conducted periodically (at least annually) throughout the registration period. **Benefits of ISO Registration** • ISO 9000 compliance results in improved teamwork, increased demand for products and

Accreditation	Accrediting Body	Description - Details
		services, cost savings from higher quality products, and timesavings with customer audits. • ISO 9000 is seen as a universal standard with strong regional and international support. ISO is a large, extended organization, consisting of members from approximately 100 countries, with more than 800 standards development committees and sub-committees, with support from 2000 working groups. Many of ISO's members are also members of regional organizations having cooperative standards programs. This ensures a cooperative relationship with ISO as a whole. • ISO covers all areas of activity and is coherent and consistent across all sectors. • ISO 9000 registration is becoming an essential competitive strategy for organizations and in many cases, a prerequisite for doing business.
		Cost of ISO Registration The cost of ISO registration will vary according to organization size, location and product scope. The direct costs are those associated with an independent registrar's review of the organization's Quality Assurance Manual, and then the on-site audit. Additional costs could be associated with consulting and advisory services which an organization may engage in determining pre-conditions for compliance, or in modifying systems and processes so as to be in compliance. Direct registration costs will typically be in the range of $5,000-10,000. In relative terms, however, the direct costs of ISO compliance are usually significantly less than the investment which is required for the internal modifications and staffing measures which are required in order to support the necessary quality assurance systems and processes.
TickIT	British Department of Trade and Industry, through organizations accredited as certification bodies (e.g., the British Computer Society)	**General Description** The TickIT initiative came about as a result of a report commissioned by the British Department of Trade and Industry to review the state of software quality and development in industry. The report showed that there was a reluctance on the part of software producers to adopt ISO 9000 because of

Accreditation	Accrediting Body	Description - Details
		its high level of generality, the difficulties related to terminology interpretation, and the confusing nature of the guidance documentation. As a result of this Report, the British government appointed the British Computer Society (BCS) to lead an initiative called TickIT. The aim of this initiative was to create a detailed method for organization, procedures and rules for a Software Sector Certification scheme that would cover the assessment and certification of an organization's software quality management scheme to ISO 9000 standards. TickIT is the U.K. interpretation of ISO 9001/9002 in the software development sector. **Certification Criteria and Process** The criteria for TickIT registration are similar to those for ISO registration -- TickIT certification automatically conveys ISO registration. The organization must document its quality assurance procedures and systems in a Quality Assurance Manual, which must be reviewed and approved by the accrediting agency. An on-site audit is also conducted. These activities are carried out by authorized, third party software auditors who have specialist training and skills in software. **The Benefits of TickIT Certification** TickIT is seen as being beneficial inasmuch as it indicates compliance with relevant ISO requirements. However, there appear to be mixed views of the benefits of TickIT as a level of certification that goes beyond ISO. Some feel that TickIT may be the start of a dangerous trend, where every different industry will want its own flavor of the ISO standard. TickIT is seen by some as moving away from the original ISO intent of being a generic standard, which can be applied to every type of industry or business.
		In the meantime, there has been significant growth in the number of TickIT approved companies, perhaps indicating that those involved in software development view the standard as being meaningful in their industry. **Costs of Certification**

Accreditation	Accrediting Body	Description - Details
		As with ISO, the cost of TickIT certification will vary depending on the size of the organization being certified; the nature of the products and services involved and the complexity of related processes; and the existing state of the organization's QA policies, systems and processes relative to those required by TickIT standards. Sources consulted by us indicate that, on average, the direct costs of TickIT certification (i.e., Quality Manual review and on-site audit) will be up to 50% more than a comparable ISO certification (i.e., $7,500 - 15,000), with the higher cost most likely attributable to the greater level of IT-related specificity involved in TickIT.
Capability Maturity Model (CMM)	Software Engineering Institute (SEI) - United States	**General Description** The Capability Maturity Model is a model for evaluating IT process maturity, and a framework for guiding process improvement efforts. There is no certification or accreditation as such which is available or granted. However, the CMM is an evolving and widely accepted framework for both self-evaluation and buyer evaluation in the IT area, and is regarded by many as an appropriate tool for evaluating quality. The CMM framework was developed with the involvement of various industry participants through the stewardship of the Software Engineering Institute. The SEI is a federally funded research and development center sponsored by the U.S. Department of Defense and operated by the Carnegie Mellon University. CMMs are models of reference that are based on best practices. CMM documents are typically structured along the lines of distinguishable process areas (PA), and then the subordinate best practices (BP). There are several CMM models, each of which focuses on a different aspect of an organization's information technology capabilities. **Capability Maturity Model for Software (CMM-SM)** The CMM-SM provides a basis for appraising and improving software processes. The SEI provides organizations with a diagnostic tool set to determine the state of their own or others' software processes relative to the CMM. To

Accreditation	Accrediting Body	Description - Details
		determine one's own processes, the appropriate method is the CMM-based Appraisal for Internal Process Improvement (CBA-IBI). To determine the processes of another, the method used would be Software Capability Evaluation (SCE). **People Capability Maturity Model (P-CMM)** The P-CMM is a CMM framework that identifies the key elements of management and development of the workforce of an organization. Its purpose is to "ready" software development and IS organizations to undertake increasingly complex applications by helping these organizations to attract, motivate, and retain the necessary talent to improve software development capability.
		Systems Engineering Capability Maturity Model (SE-CMM) The SE-CMM identifies the key elements of an organization's engineering process that must exist to ensure good systems engineering. The collaborative team working on SE-CMM is also in the process of developing an integrated product development (IPD) framework. IPD is a systematic approach that achieves a timely collaboration of disciplines throughout the product life cycle to better satisfy customer needs. **Software Acquisition Capability Maturity Model (SA-CMM)** At the present time, the Department of Defense, federal agencies, the SEI and industry are collaborating to develop a Software Acquisition Capability Maturity Model (SA-CMM). **Accreditation Criteria and Process** The CMM framework is designed to assist the developers and vendors of IS/IT products in evaluating and improving their quality processes, and to also assist buyers of IT/IS products or supplies in assessing the maturity and quality of the processes used by others with whom they deal. The CMM is not formally used for accreditation purposes, and no specific certification or designation is granted by the SEI or anyone else on the basis of the CMM. However, because the CMM has evolved through the

Accreditation	Accrediting Body	Description - Details
		involvement of key industry players and is becoming more widely known, it is regarded as a legitimate process for evaluating existing software engineering processes, and in determining areas where quality improvements can be made.
		Benefits of CMM The CMM models are built around best practices that have been recognized and documented by those involved in the industry. Hence, they are seen as being valid tools for evaluating and developing quality management processes. Organizations that meet CMM standards will significantly advance themselves towards ISO 9001 compliance. For example, a firm which satisfies all Level 3 Process Areas under CMM-SM would have little if any difficulty in obtaining ISO 9001 certification. A Level 2 organization would have significant advantages in reaching ISO 9001 certification. **Costs of the CMM** Because CMM is an evaluation framework and not a certification, there is no discrete cost that can be quoted, as costs associated with CMM will vary. For example, the cost of obtaining CMM documentation is relatively insignificant, while the cost of conducting a self-evaluation using an outside consultant will typically involve fees up to several thousand dollars, depending on the nature, size and location of the organization. The cost of training staff for the purpose of developing an in-house capacity for self-evaluation would be less. As with certification systems like ISO and TickIT, the direct costs associated with evaluation are far less than those that are often required in order modify existing systems and processes to reach "best practices" levels.
CIPPM Certification	Center for International Project & Program Management (Michigan, U.S.A.)	**General Description** The CIPPM is an international, non-profit association and center of advanced communication, research, and learning for professional project managers and those interested in project management. Membership

Accreditation	Accrediting Body	Description - Details
		in the CIPPM is open to organizations and to professional project and program managers in all domains (i.e., not exclusively IT) who are interested in the advancement and extended use of Project and Program Management. CIPPM is an internationally recognized and accepted certification standard which is knowledge and practice based. ISO has approved CIPPM certification for ISO 9000-4 (Quality Systems -- Guide to Dependability Program Management), ISO 9004-2 (Quality Systems Elements -- Guidelines for Services), and the draft ISO 10006 (Guideline to Quality in Project Management). **Certification Process and Criteria** CIPPM Certification is granted by virtue of membership acceptance. There are no tests, credential requirements or challenges associated with CIPPM certification, but when making application for membership, applicants must state that they will abide by the Ethical Guidelines of CIPPM. Furthermore, members are obliged to publish a statement of compliance with these Ethical Guidelines in all sales and development materials and proposals. These materials must also display the CIPPM logo without size reduction. The CIPPM's Ethical Guidelines cover the areas noted below. a) Protection of Client - CIPPM members will protect their clients' interests and serve these interests first and foremost. Members must not allow themselves or their agencies to become victims of conflict of interest or to become the perpetrator of the degradation or loss of the client's interests or products. No Dual Role Contracts - Under no circumstances are CIPPM members permitted to assume dual roles in relation to the same project or contract. Doing so is considered a serious breach of professional ethics. c) Protection and Practice of Quality - CIPPM members must practice and involve themselves in high quality standards. They must practice Continuous Quality Improvement as per the writings of Edward Deming, and they must involve themselves and their organizations in the

Accreditation	Accrediting Body	Description - Details
		development of national and international quality standards, including specifically ISO 9000+ and ISO 10006, without relying solely on those standards as rote activity. d) Requirement of Written Guarantee - CIPPM members are obliged to supply a written guarantee on product and/or service to their customers. e) Contracting/Hiring Policies - CIPPM strongly believes in supporting localized and fair economic development and government. Therefore, CIPPM believes that members must first seek and consider candidates with a local preference. **Benefits of CIPPM Membership/Certification** Because the CIPPM is linked with the relevant ISO standards as they relate to quality systems management, the CIPPM is regarded as indicating a high level of competence and quality in this area. The use of the CIPPM logo and the Ethical Guidelines text in promotional materials and proposals offers assurance of expertise and quality. Membership also includes a professional listing on the CIPPM home page, and in the Agents and/or Training and Consulting Services sections of the CIPPM's web site. **Cost of Membership/Certification** Membership costs $125 US a year.
SOME VENDOR-SPECIFIC ACCREDITATION PROGRAMS		
Novell Reseller Program **Novell Authorized Service Center** **Novell Regional Consulting Partner**	Novell	Novell maintains a three-tiered certification program for its channel partners. The Novell Reseller Program covers authorized resellers of Novell software. Gold partners have been certified under the Regional Consulting Partner Program, and Platinum partners have been certified as Authorized Service Centers. These certifications are intended to reflect consistent levels of advanced expertise, and requirements include minimum standards for the number and credentials of engineering staff, demonstration capabilities, product/service revenues, support

Accreditation	Accrediting Body	Description - Details
		lab configurations and customer support hot lines.
Business Partner Program Lotus Authorized Education Center Lotus Desktop Training Company	Lotus	Member, Qualified Partner, or Premium Partner status is granted under the Lotus Business Partner Program depending on factors such as the organization's knowledge of, and experience with, Lotus products; their level of sales and commitment to Lotus products; and the number of Lotus certified staff. Partners who are involved in training and education may also be certified as Lotus Authorized Education Centers (LAEC) or Lotus Desktop Training Companies (LDTC).
Autodesk Systems Center (ASC) ASC Solutions Training Premier Support Center	Autodesk	Resellers of Autodesk software (e.g., AutoCAD, ARX, AutoLISP) and developers of add on applications may initially be certified by AutoDesk as an Autodesk Systems Center (ASC), and then further certified as an ASC Training Solution site or an Authorized Premier Support Center.
Sales Partner Support Partner Silver Partner Gold Partner	Cisco	Four levels of certification are available to Cisco channel partners. Sales Partners provide advanced pre-sales expertise; Support Partners provide advanced hardware and support and maintenance; Silver Certified Partners combine the capabilities of both the Sales and Support Partners, requiring at least two Cisco Certified Internetwork Engineers (CCIE); and Gold Certified Partners, whose customers typically work with the largest network installations.
Oracle Certification Program	Oracle Software	Need information to fill-in
Solaris Certification Program	Sun Microsystems	The Sun certification program is available to Catalyst developers who market Solaris products for the SPARC or x86 platforms. The program is designed to indicate a product's compatibility with the Solaris operating environment, including software, peripherals and computer systems. Certified organizations are permitted to use the Solaris compatible logo, their products are listed in the Solaris Hardware Compatibility Guide, and are given access to various Sunsoft promotional

Accreditation	Accrediting Body	Description - Details
		activities and lead generating opportunities.

Annex C

TECHNOLOGY PARK DEVELOPMENT EXPERIENCES AND POSSIBLE APPLICATION TO JORDAN

C.1 INTRODUCTION

This annex presents a brief overview of technology park development experiences worldwide, emphasizing those oriented to software and IT services, and a very preliminary assessment of the application of this concept to Jordan.[4] It is meant to provide a conceptual framework to guide future work in this area.

Technology-oriented parks have been used widely around the world as vehicles for economic development. The number of "research, technology, or science" parks of course depends on how those parks are defined. But by most estimates, over 60 countries (both industrialized and emerging) have established over 250 technology parks, many of which cater specifically to the software and information technology services industry (see Box).

Most of these projects share certain basic elements. As defined by the International Association of Science Parks (IASP), qualifying science parks are those that:

Have operational links with Universities, Research Centers and/or other Institutions of Higher Education

Are designed to encourage the formation and growth of knowledge-based industries or high value-added tertiary firms, normally resident on site.

Have a steady management team actively engaged in fostering the transfer of technology and business skills to tenant organizations.

While these parks share common elements, they differ in terms of:

Objectives
Size and physical layout
Ownership and management
Typical activities and occupants
Links to universities and technology bases
Incentives
Infrastructure, facilities and services

Technology Parks

Typical Facilities

- Research and testing lab
- Intelligent buildings
- On-site teleport earth station
- Technology incubator/center
- Wide Area Network
- Recreational facilities
- Shared business services
- Training and consultancy center
- Exhibition areas

Some Examples

Software and IT Services
- Techopark Kerala, India
- Software Technology Park, Brazil
- InfoPark Budapest, Hungary
- Multimedia Super Corridor, Malaysia

Incubation
- Tefen Industrial Park, Israel
- Rensselaer Polytechnic Park, USA
- Massachusetts Biotechnology Park, USA

Research and Development
- NSTDA Science Park, Thailand
- Taedok Science Town, South Korea
- Cambridge Research Park, UK

High-Tech Manufacturing
- Hsinchu Science Park, Taiwan
- Shenzen High-Tech Park, China
- Singapore Science Park, Singapore

The discussion below reviews these differing aspects of technology parks, and outlines costs and benefits to the sponsoring country and to the individual company locating in such parks.

[4] The annex was prepared ny Kishore Rao, TSG, incorporating materials developed by Ramzi Kawar and his team at CDG/Al-Jidara, and Dr. Michael Lugar, University of North Carolina.

C.2 RANGE AND DIVERSITY OF TECHNOLOGY PARKS

Objectives

The design, services and functions of a technology park is first a reflection of its basic purpose. Many countries fail to recognize the fundamental diversity of technology parks, and tend to view these projects as specialized industrial parks. But the purpose and forms of technology parks vary greatly. Common objectives of technology parks include:

Promotion of research and development in leading-edge technologies
Serve as a "growth pole" strategy for the development of regions
Promote entrepreneurship and business development in technology areas
Generate exports and create jobs in high-tech areas

While none of these objectives are mutually exclusive, successful projects have generally been those that have a clear and limited focus and set of objectives.

Research and Development. In some cases, parks are conceived as long term instruments to transform economic bases from typically more traditional sectors to higher tech. Job growth in these instances must be measured over a longer period of time as new technologies are developed or different types of businesses are induced to locate in the region. A prime example is **Research Triangle Park** in North Carolina. The electronics, pharmaceutical, and telecommunications clusters now there developed slowly over a forty year period and gradually helped transform the central part of North Carolina from an agriculture- and low wage manufacturing-based economy to high tech R&D. Other examples are found in most advanced economies, including the science parks in Finland, Sweden, United Kingdom, South Korea, Japan, Singapore, Taiwan, etc.

Growth Poles. Other parks have been developed as so-called technopoles or growth poles. Parks have served as the cornerstone of growth pole strategy – as a way to move population from dominant cities – in Japan (in **Tsukuba Science City** and Kyoto, for example), Korea (for example, **Taedok Science Town** in Taejon), and Taiwan (**Hsinchu Science City**). In those cases, park development was coordinated with other investment strategies, for infrastructure, higher education and research, and housing. Other prominent examples include the **Sophia Antipolis technopole** in France and the **Medeira Technopole** in Portugal.

Incubation. Another explicit objective of technology parks is to serve as an incubator to promote start-ups and business development in defined technology areas. While many parks—such as the Singapore Science Park's Innovation Centre—house incubtor facilities on-site, a few parks are incubators themselves. A prime example of this is the **Tefen Park** north of Haifa in Israel, that serves as an incubator for export-oriented technology companies.

Export Generation. Another category of technology parks aim to generate exports in internationally trade services and products. A leading example are the twelve **Software Technology Parks** in India that currently account for 70% of India's total software and IT services exports of US$4 billion. Other examples are the 80 science and technology parks in **China**, and the **Agean Free Zone Technopark** in Turkey.

Size and Physical Layout

Parks range in size from one large building in an urban setting—for example, the **University City Science Park** in Philadelphia, Pennsylvania, and several facilities in Germany—to several thousand hectares, such as the 8,000 hectare **Sophia Esterel Science Park** in France. One common (if not universal) feature of technology parks is their physical attractiveness. Park

developers believe that good design and natural amenities are necessary to develop a conducive work environment for knowledge-based industries. Many parks are developed as beautiful campuses with office park facilities, as a result. A leading example is the **Hsinchu Science-Based Industrial Park** in Taiwan, that was deliberately developed to resemble facilities in Silicon Valley in order to attract diaspora Taiwanese engineers working in California.

Hsinchu Science Park, Taiwan

Research Triangle Park, NC

Kyoto Science Park, Japan

Ownership and Management

Technology parks are owned by universities (University of Utah and **Stanford Research Parks** in the U.S., for example), government agencies (the **National Science and Technology Development Agency Research Park** near Bangkok), by private companies (**Kyoto Science Park**), and by consortia.

The objectives of the parks reflect their ownership. University-owned parks tend to focus on university-originated technology and on building industry-university linkages. However, universities also see parks as potential sources of real estate revenue (**Centennial Campus** at North Carolina State University, **Cambridge Research Park**, UK). Parks sponsored by government agencies are typically part of regional or national development efforts. An increasing number of parks are privately developed and owned. Leading investors in these projects internationally including US, French, British, Singaporean, Thai and South African groups, most of which have a property development background.

Management of parks varies too, but increasingly, professional management companies are being retained for that function. Some universities and government agencies continue to operate their own parks. **Research Triangle Park** is operated by a not-for-profit foundation that reports to an ownership team comprised of the region's universities and the state government.

Typical Activities and Occupants

Parks also differ in terms of their sectoral focus and industry orientation. Many parks tend to specialize in a few technology and industry areas, serving as "centers of excellence," promoting innovation in a particular area. Examples include:

Singapore Science Park, Singapore—information technology and telecommunications
Hsinchu Science-Based Industrial Park, Taiwan—computers, peripherals, integrated circuits
Bangalore Software Technology Park, India—software and IT services
Taedok Science Town, South Korea—memory chips, aerospace
Software Technology Park, Brazil—software engineering

University City Science Center, USA—engineering, biomedicine, materials
Helsinki Science Park, Finland—biotechnology, food industry
National Science and Technology Development Agency Science Park, Thailand—biotechnology, metals and material technology, electronics and computer technology

Government-run technology parks oriented to basic science and R&D typically host government labs. Examples include the NSTDA park in Thailand, the national science labs in the US (Sandia, Los Alamos, and others), and Taedok Science Town in South Korea.

Other technology parks resemble typical office or business parks, accommodating regional and international headquarters companies. Leading examples include **Stanford Research Park**, **Cambridge Research Park** and **Dublin Science and Technology Park** in Ireland.

Links to Universities and Technology Bases

Most successful science parks had a meaningful connection with an institution of higher education. As noted, some parks have been developed by universities as sites for university-related activity (e.g., **Stanford Research Park**, USA; *Cambridge Research Park*, UK; **Parque Industrial de la Universidad de Guadalajara**, Mexico; **The Australian Technology Park**). Others have forged relationships with nearby universities (**Amsterdam Science Park**, **Sophia Antipolis France**, **NOVUM Research Park** Sweden, **Patras Science Park** Greece, **Tecnopolis Csata Novus Ortis** Italy). Parks developing in regions without institutions of higher learning have created them as part of the park's amenities to tenants. That, clearly, is costly. Increasingly, parks are connecting to universities and colleges electronically, making immediate proximity less important.

The second type of focus is around technology sectors, usually capitalizing on existing strengths in the regional industrial base and the local universities. Larger parks may have several foci (Research Triangle Park with electronics, pharmaceuticals and biotech, and telecommunications; NSTDA Park in Thailand around biotech, electronics, and materials science). But many parks focus more narrowly, and even use the focus in their name as a marketing ploy (**Audubon Biomedical Science and Technology Park**, **Harry Hines Medical Research Park**, **Environmental Technology Center Neopoli Oy** Finland, **Agro-Business Park** Denmark, **Infopark Budapest**, and **Kalundborg Ecoindustrial Park** Denmark).

Incentives

Different parks provide, through their sponsoring entity, a wide variety of incentives for businesses. Those incentives tend to be largest when the park is part of the national or state government's economic development program. Israel's central government, for example, provides businesses moving to Tefen (and other designated locations) a benefit of 24 percent of their investment in building and equipment, or a ten year income tax holiday. However, these types of incentives are usually available to all qualifying high-tech investments, whether or not physcially located within a technology park.

However, a few countries have either adapted existing incentives (usually within free zone schemes) or developed new packages specifically

Indian Software Technology Park Scheme

Incentives

- STP may be a stand-alone unit or located in a park
- 100% duty-free imports of IT equipment for all STP units
- 100% duty exemption on all imports to STP units meeting export obligation
- 5 year income tax holiday taken as a block during the first 8 years of operation
- 25% local sales up to 25% of export value
- Purchases from customs territory free of duties and taxes
- 100% foreign ownership possible
- Tax-free repatriation of fees, royalties, dividends, etc. of foreign investors

Source: Department of Electronics

for enterprises located within technology parks. A leading example of the latter is the Software Technology Park scheme of India (see Box) which is a major reason behind the success of the industry, especially in terms of attracting foreign investment.

Infrastructure, Facilities and Services

Unlike most general industrial parks, technology parks emphasize purpose-built infrastructure and facilities, tailored to meet the requirements of target industries and activities. The range of facilities typically found include:

Research and testing labs—funded by government and major private corporations

Business and technology incubators—operated by specialized subsidiary companies or independent operators on a commercial basis, providing a full range of business, marketing, legal, financial, and technical support services for start-up firms

High-tech office buildings with research units—usually pre-fabricated "intelligent" office buildings, for use on a multi-tenant basis with shared business support facilities and local area networking connections

Standard factory buildings suitable for a variety of manufacturing and warehousing activities

Residential, commercial and recreational areas for employees and managers

Exhibition areas, convention centers, libraries and other

Training and consultancy center—typically attached to an incubator or testing facility

Dedicated, high-speed telecommunications facilities, offering high-speed (1.5 mbps) 7/24 lines at international prices, as well as value-added network services (see Box on STPs in India)

Centralized support services including dedicated power, hazardous waste collection and disposal, as well as a range of business services at reduced rates (e.g., management training, technical assistance, procurement assistance, liaison with nearby universities and businesses, regulatory approvals, etc.)

The overall objective is to create a conducive work environment that enhances worker productivity, and promotes technological collaboration and innovation among a cluster of inter-related companies.

Telecommunication Facilities in Indian Software Technology Parks

High Speed Data Communications

- Wide band F-3 IBS earth stations (2X2 mbps) serving as international gateways
- Point-to-multipoint digital TDMA links to connect software houses located outside the STP to the international gateway in the STP
- Local Area Network for units within the STP with data rates up to 64 kbps

Integrated Network Services (SoftNET)

- SoftPOINT: leased, digital, point-to-point 64kbps line
- SoftLINK: multi-vendor network for value-added services (e.g., email, FTP, remote log-in, public domain software library access)
- SoftPAC: X.25 based packet switching data networks

Video Conferencing/Distance Learning facilities

C.3 BENEFITS

As the previous discussion indicates, the types of technology parks around the world vary greatly. Depending on the type of park, industrial focus, extent of government funding, additionality of investment—the magnitude of

economic benefits vary significantly. The value of a technology park is also different for each potential beneficiary—host country/region, private company, or university.

Host Country

From the perspective of host countries, technology parks provide a number of potential benefits. The most important of these include:

Technological development—parks offer the potential for industrial upgrading, research and technological innovation in high-tech areas

Cluster development—parks can create self-sustaining industrial clusters in core technologies, and lead to the development of technology corridors in a wider area

Job generation—parks are an efficient means of creating high value-added jobs in leading technologies

Business efficiency—parks can enhance the operating competitive, image and investment environment of a region

University-industry linkages—parks can offer a concrete mechanism for collaboration between universities and industries, and a focal point for technology transfer

The economic impact of technology parks is difficult to estimate given the large variations on types of parks worldwide. According to most estimates, there some 250 technology, science and research-based parks in some 60 countries worldwide. These parks account for a significant part of high-tech manufacturing and services, especially in developing countries. The software technology parks in India, for example, account for 70% of the export earnings of the software sector overall. Selected examples of these types of projects are profiled in Table C.1.

Table C.1: Economic Impact of Technology Parks—Some Examples

Technology Park	Size	Date Established	No. of Firms	Employment
Singapore Science Park, Singapore	30 hectares	1980	226	7,000
Rennes Atalante Science & Technology Park, France	70 hectares	1978	250	8,000
Hsinchu Science-Based Industrial Park, Taiwan	580 hectares	1980	272	72,623
University City Science Center, Philadelphia, USA	7 hectares	1963	140	7,000
Kyoto Research Park, Japan	8.5 hectares	1988	80	2,400
National Technological Park, Ireland	260 hectares	1991	90	3,500
Technopark Kerala, India	73 hectares	1994	35	2,000
Surrey Research Park, UK	28.5 hectares	1974	76	2,000

Source: AMIR research.

The overall economic impact of a technology park depends on a number of factors. Parks that have been developed through heavy government outlays for infrastructure development and operation are rarely economically and financially feasible and sustainable. Partnership with the private sector in infrastructure development, therefore, is critical. Operation of the park on a cost-recovery basis is also a factor. Heavily subsidized projects are generally not financially sustainable. The net economic impact of a park also depends on the extent to which investments and employment is truly additional, and would not have taken place anyway in the absence of a park. The impact of a project is reduced also if most investments are simple relocations of companies already operating in the country. Backward supply linkages of high-tech industries also tend to be low, until a critical mass of local, non-park industries develops over time.

Individual Company

Benefits from a technology park location for an individual company vary again depending on the scale and type of investment. For small-scale and start-up investments, for example, the total package of facilities, support services, and technical and financial resources available through a park are a major attraction. In general, location within a technology park—rather than outside—provides firms with a number of benefits:

Access to a nucleus of technology resources and specialized services in one area
Scope for collaboration with other technology companies and suppliers
Access to better-quality, purpose-built infrastructure and facilities and competitive prices
Reduction in costs through the provision of shared services and facilities
Superior quality of life and amenities
Access to a pool of workers, technicians and scientists, with partner universities and institutes
Access to a competitive package of investment incentives

The major drawback of some technology park locations—particularly as projects expand and mature over time—is the possibility of increased labor turnover. Employees can more easily jump from one company to another, given the proximity of similar companies in one area. But these are less prevalent in technology parks relative to general industrial parks.

C.4 APPLICATION TO JORDAN

Possible Rationale

Our discussions with IT companies in Jordan has clearly indicated that there is little demand for an Information Technology services park at the present time. Existing companies are already well-established, have invested in office space and facilities and reluctant to move. IT professionals do want to relocate, especially to a location far away from the center of Amman.

Part of the guarded reaction of the industry is the result of the poor experience with government-developed free zones and industrial estates in Jordan. Technology parks are associated with these projects which are poorly configured and managed by international standards. There are no office parks or purpose-built facilities in the country which can provide an example of the types of efficiencies possible from a technology park location.

However, international experience indicates that demand for an attractive, purpose-built facility will grow as the industry expands over the next 3-5 years and foreign investment increases. Existing office facilities available in Amman are insufficient to meet future demand increases; many of the IT companies we surveyed had pending expansion plans. A technology park could have a number of important benefits to the Jordanian IT industry

Foster cooperation among IT companies in marketing, research and development, allowing them to reach a larger scale

Increase the productivity of their workers through better facilities and recreational, social and other facilities

Reduce start-up and operating costs through provision of shared services and facilities, especially in terms of dedicated, high-speed telecommunications

Facilitate entrepreneurship, technology, on-going education and business development through on-site incubators and training centers

Serve as a focal point to attract foreign investment in the industry

Serve as a center for training and skills development in partnership with universities, to provide access to an appropriately skilled workforce

The remainder of the discussion below presents a conceptual overview of a technology park in Jordan, including a brief assessment of prospective sites.

Outline of a Technology Park Concept

Possible Demand. Given the small size of software and IT services companies in Jordan, a technology park will need to cater to other, compatible, high-tech industries and research activities. The park should therefore be configured to accommodate several groups of users:

Software and IT services firms. Our very conservative demand projection in the main body of this report forecast 35 new companies in Jordan in the sector. At least a third of these companies would likely locate in a new technology park.

High-tech manufacturers, in clean industries such as electronics, computers, telecommunications, biotechnology, etc.

Professional services companies, such as publishing houses

Government organizations in the IT sector, including perhaps the RSS, NIC, ministries of information, education, etc.

Specialized business services providers such as the Jordan Technology Group

Physical Design Concept. The design and layout of the technology park shall have to be carefully configured to ensure that seemingly incompatible activities—such as computer hardware assembly, research and software services—can co-exist and prosper in the same area. This suggests that the technology park should be developed in several zones:

Zone 1: office park for software/IT and research activities
Zone 2: industrial zone for high-tech manufacturing
Zone 3: exhibition areas and common facilities
Zone 4: residential and commercial area
Each zone would be separate, but integrated in the land use plan. Software and IT services could be directly linked to hardware manufacturing and assembly activities, in contiguous sites.

A key requirement for the park would be low-density development, with a commitment to high-quality landscaping and integrated social, recreational, commercial and residential facilities. Most successful technology and science parks share a common characteristic—the specification and clear application of a clear and comprehensive set of development covenants. These are rules that cover permitted land uses, variances, performance standards, space allocations, parking and loading regulations, architectural and engineering provisions, signage and paint specifications, etc. The whole objective of this is to create a high-quality "campus setting" environment, that meets the needs of demanding professionals.

Size and Location. The amount of space required for software/IT and related service operations is modest, given that an average firm shall have 30-50 employees, with office space requirements of about 300-500m2. A technology park dedicated solely for software and related

professional services will need about 20-30 hectares; if industrial uses are also envisaged, the space requirement may increase to 60-100 hectares.

Three locations around Amman were tentatively selected by the team and evaluated in a multicriteria decision analysis framework as shown below.

Table C.2: Assessment of Some Sites for a Technology Park

Criterion	Relative Weight (1 - 10)	Potential Locations					
		Amman 1 Airport Area (w'ted score)		Amman 2 Jubieha/RSS (w'ted score)		Ajloun (w'ted score)	
Infrastructure	10	2	(20)	2	(10)	3	(30)
Logistics	5	2	(10)	1	(5)	2	(10)
Land Cost	4	1	(4)	3	(12)	2	(8)
Human Resources Availability	9	2	(18)	1	(9)	2	(18)
Academic Accessibility	10	2	(20)	1	(10)	2	(20)
Operation Cost	5	2	(10)	1	(5)	2	(10)
Availability of land	8	1	(8)	3	(24)	2	(16)
TOTAL			90		75		112
OVERALL RANKING		2nd		1st		3rd	

Scores: 1 Excellent; 2 Very Good; 3 Good
Source: AMIR research.

From our brief analysis, the best site is the **Jubieha/RSS site** that has the best access to business support and logistics services; availability and access of skilled workers; good links to universities/research institutes; and ready availability of land. The second choice would be a site near Queen Alia airport, although land costs and infrastructure availability are much lower, and proximity to the airport is much less important than proximity to the full set of amenities and services in Amman. The worst option would be a project in Ajloun. Development costs will be much higher given the lack of infrastructure and services in the area. The quality of life is much lower which is an important consideration for software/IT professionals.

Facilities, Services and Management. The park should offer three types of "intelligent" buildings for short-term lease to IT companies:

Low-rise pre-fabricated buildings, easily exapandable and customizable for individual requirements
Research units with ready-built space, suitable for wet laboratories if required
Small, flexible units of 20-100m2 with business support services and shared facilities for start-up companies

These buildings should be specifically designed for IT companies, with a full set of amenities (e.g., local area networking, special lighting, HVAC systems, 24 hour secutiry, etc). To start with, these could be in the form of several, multi-tenant office buildings. In addition, developed land parcels of various sizes could be made available for companies for their own custom-built facilities.

Another key facility could be an **Innovation Center**, housing an incubator, training center and related units. The center would provide meeting rooms, reception area, fully fitted office unit, flexible lease arrangements, technical and legal services, etc—for start-up companies.

A Software and IT services **Center of Excellence** would be a comprehensive training and consultancy center, offering on-site and distance learning facilities for employees of park companies, and other students. The training center could have teleconferencing and distance learning facilities. The Center could be a joint venture between the JCS, a Jordanian

university,a and an overseas university or IT software/hardware vendor, as described in Annex B.

A comprehensive set of **value-added telecommunications services** should also be ensured. These include the provision of high-speed, point-to-point 7/24 data lines, through either a teleport or digiport facility on-site acting as an international gateway. The facility could be a private operator, or a joint venture between a private telecommunications company and the JTC which has occurred in several technology/IT parks. An ISP could provide a full set of internet and network services for park tenants. A videoconferencing facility could be provided for use of park companies.

Other facilities and amenities that should be offered include:

Exhibition area
Commercial areas
Residential areas
Convention center and auditorium
Sports and recreational facilities
Standard factory buildings for industrial users in an industrial zone

A key element to ensure the success of the project is private sector development and management of the park. There are a number of US, European and Far Eastern property development companies that specialize in technology park development and management, and should be approached for interest in a project of this nature in Jordan. At the same time, successful development of the park will require a clear partnership with the Government, especially in terms of the provision of external, off-site infrastructure and services.

The viability of a technology park project, its configuration, and means for financing, management and operation—should all be established through a comprehensive feasibility study.

Annex D

JORDAN SOFTWARE AND IT FIRM SURVEY-SUMMARY OF RESULTS

D.1 INTRODUCTION

The Jordan U.S. Business Partnership (JUSBP) carried out a survey in coordination with the AMIR[5] progam, to support the national IT strategy development initiative (REACH) spearheaded by the Jordan Computer Society. Its purpose was to obtain more detailed information about companies engaged in software development and other IT service activities, and to better understand recent trends in the local and regional market. The survey was carried out in July and August of 1999.

This report has been drafted by AMIR consultant Vincent Ruddy (Senior Consultant, The Services Group), who received copies of completed survey forms along with tabulated results, and coordinated with JUSBP staff during final steps of their work.

D.2 METHODOLOGY

Consultants developed a 4-page questionnaire that was faxed and/or e-mailed to approximately 43 different software and IT service companies[6]. Twenty three companies responded and returned the questionnaire. In some cases, it was necessary to call back respondents to clarify their answers or solicit responses to unanswered questions. Results were then tabulated, analyzed, and summarized as described below.

Incomplete or problematic responses spurred efforts to collect additional information through a second and third survey, focused specifically on exports and employee productivity for software and IT service activities. The second was a single page questionnaire, while the third was administered via e-mail.[7] This allowed for more accurate estimates, and effectively permitted expansion of the sample since several responding companies were not included in the original 23.

D.3 COMPANY CHARACTERISTICS

Most are Small

The 23 responding firms can be considered to represent an indicative cross-section of IT software and service companies in Jordan. Most are small, ranging from 7 to 62 employees. Over half the companies employ less than 20 employees. Registered capital ranged between JD 5,000 to 1.2 million, with only 7 exceeding JD 60,000. The average number of employees/firm for the sample is 25.

[5] Both JUSBP and AMIR (Access to Microfinance & Improved Implementation of Policy Reform) are funded by the United States Agency for International Development.
[6] The companies were identified from a list provided by the Jordan Computer Society.
[7] The e-mailed questionnaire was administered by Mr. Karim Kawar, President of JCS; large portions of respondents to this effort did not specify export revenues, probably due to confidentiality concerns.

Table 1: Distribution of Respondents by Number of Employees

Number of Employees	Number of Companies in Range	Percentage of Total Sample
1-10	5	21.7%
11-20	8	34.8%
21-30	3	13.0%
31-40	3	13.0%
41-50	2	8.7%
51-60	1	4.3%
61+	1	4.3%
total	23	100%

Revenue Levels are Small

Smaller firms report revenue on the order of JD 65,000 to 80,000; Larger firms of the sample report revenue ranging from JD 1 million to JD 2 million. One large firm whose software activities comprise only 30 percent of total revenue reported JD 7.2 million in revenue (i.e., approximately JD 2.16 million from software). The median revenue for the 23 firms of the initial survey was JD 440,000 (US$ 619,718). Total revenue reported by these and subsequent respondents comes to US $22.3 million for software and IT service activities, plus US $11.7 million for hardware sales, for a grand total of US $34 million.

Most are Limited Liability Companies

Fifteen (65%) utilize the limited liability company form, while three (13%) are partnerships, four (17%) use the "cooperation" form, and only one indicated "other" form.

Most are New Companies

As seen in Table 2, a large proportion of Jordanian IT software companies are recently formed. Eight companies (35%) were started within the last 5 years, while 65 percent are 10 years old or less.

Table 2: Age Distribution of Jordanian Software Companies

Year Established	Number of Companies in Range	Percentage of Total Sample
1994-1998 (5 years old or younger)	8	34.8%
1989-1993 (6-10 years old)	7	30.4
1988 or before (more than 10 years old)	8	34.8%

Limited Foreign Investment

Only one respondent indicated involvement of foreign equity. Another firm indicated involvement with a foreign entity through a type of strategic alliance, while three more acknowledged licensing agreements with foreign companies. This limited involvement of foreign entities likely extends beyond the sample firms to the entire population of IT software companies. The nascent nature of Jordan's IT software sector, along with regulatory barriers, Jordan's small market size, and limited investment promotion capacity are likely causes.

D.4 COMMUNICATIONS AND INTERNET

Relatively High Telecommunications Costs

The average expenditure on telecommunications as indicated by 21 respondents comes to approximately JD 10,990. Taking into consideration average revenue figures (see above) and using some simplifying assumptions, it is possible to put this figure into perspective in terms of the overall cost structure of Jordanian IT software firms: approximately 1.1% of total revenues. This is a relatively high figure-- smaller sized service firms involved with extensive international telecommunications needs normally find telecommunication runs around 0.15% of revenues.

Majority Have Own Web Site

Fourteen of the 23 respondents indicate that they possess an internet web-site.

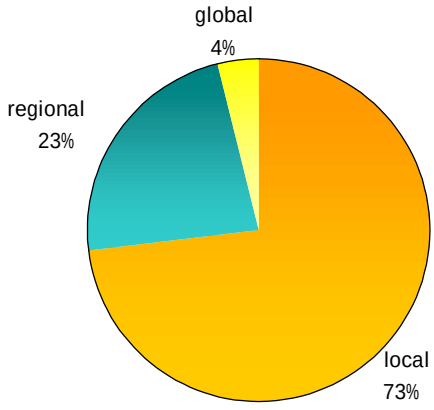
None Appear to be Engaged in E-Commerce

No respondents specified e-commerce activities as being within their current scope of work. However, during focus group meetings several company representatives did indicate e-commerce as an emerging market niche with great potential.

D.5 EXPORT PATTERNS

At present, hard data on Jordanian exports of software products and services do not exist. The survey sought to partially fill this gap by asking each firm certain questions concerning export activity. Results are as follows:

Figure 1: Firm Sales



Substantial and Increasing Number of Firms Export

Of 23 initial survey respondents, 13 (56.5%) indicate that they are presently (August 1999) exporting. In 1998, 11 of these firms reported exports; in 1997, 8 of them indicated that they

were exporting. In other words, each of the last 2 years has seen an increasing number of first time exporters entering the ranks.

Export Volumes are Growing

Exports for the 23 respondents grew from JD 630,000 in 1997 (US $887,324) to JD 1,500,250 in 1998 ($2.1 million). This annual growth (138 percent) compares favorably to neighboring Israel (50 percent in 1998), although it should be remembered that Israeli growth occurs from a larger base. Part of this high Jordanian software/IT service growth is attributable to first-time exporters joining the ranks (see above), while another part comes from growth of established exporters (i.e., those who reported exports in 1997 or earlier-- this group's exports grew 47.4 percent).

Including data collected in the second and third surveys, reported exports for 1998 exceed US $7.5 million. If one assumes unreported exports to be 50% of reported exports, this would bring total exports to $11.25 million-- a small but substantial figure for a country such as Jordan.

Regional Market is the Most Important

Saudi Arabia, UAE, Yemen, Qatar, and Oman are mentioned as target markets by respondents. One mentioned Syria as a market for training and application development. A limited number of firms export to European and North American countries. One firm mentioned exporting to South Africa.

D.6 OTHER MARKET CHARACTERISTICS

Outsourcing

Seven firms (23% of initial sample) indicate that they are engaged with outsourcing activities. The smallest outsourcing contract ranges from a minimum of JD 1,000 (according to a 10-employee firm), to JD 60,000 (a firm with 17 employees). The average outsourcing contract for the respondents runs at JD 38,333.

Market Niches

Firms indicate several different market niches that they are targeting, including: banking and financial services; hospitals; insurance companies; hotels; car rental companies; publishers; training programs for a variety of firms and institutions; general software development, systems integration; total solutions & turnkey IT systems; computer telephony systems (voice mail, etc.); bilingual document management systems; remote sensing/GIS; animation/multi-media applications; military administrative systems; management and general IT consulting. Several firms indicate substantial activities with the government sector.

Firms Do Not Receive Marketing Support

Not a single firm indicated that they are receiving support from the Jordanian Export Development Corporation (JEDCO), or any other body focused on export promotion.[8] All appear to handle promotion (as well as quality control and other activities) strictly in-house.

[8] Industry experts report that JEDCO has made efforts to include local s/w developers at major trade shows, but cost sharing requirements of 50% of expenses were seen by local companies as being too high given firms' available resources for marketing.

Products and Services

As seen in Table 3, most firms are engaged in developing software as a solution. In terms of more specific activities such as migration of already built up software to another language/upgrade/format, less firms indicate doing this, but still a majority say they do. The results in Table 3 should be considered with a degree of caution, since the survey design may have encouraged yes answers from companies whose present activities are limited or non-existent.

Table 3: What Jordanian IT service companies do

Question	Percentage Responding Yes
Do you develop software as a solution?	87%
Do you produced packaged software?	68%
Do you include any ready software as part of your final product?	65%
Do you support localization and translation?	74%
Is part of your work involved in migration of already built software to another in another language or upgrade or format?	55%

D.7 WORKFORCE ISSUES

Software Labor is Productive

Average productivity (as measured by output per worker per year) for the second survey iteration comes out to approximately JD 20,141 (US$28,368). As seen in Table 4, this figure compares favorably with estimations of productivity in Egypt and India (about US$20,000 in each case, according to AMIR research).

Wages are Competitive

The survey did not collect wage data. However, data collected from other sources give us a fairly good idea of average wages in the IT softwaresector. As seen in Table 4, these wages vary according to category and experience. They are substantially higher than corresponding wages for unskilled workers (approx. US$100-157/month); general skilled labor (US$157-257/month); general office workers (US$171-571); middle managers (US$285-857/month); and general managers (US$643-1714) in the average company in Amman.[9]

Table 4: Typical Wages in IT Software Companies

	Starting Level	2 or more years experience
Programmer (US $/month)	312	550-800
Technical Writer (US$/month)	400	600-700
Systems Analyst (US$/month)	316	558-811
Project Manager (US$/month)	316	714-1217
General Manager of	1,571	2,000-2,536

[9] Source of General reference wages in Amman: Aqaba Freeport Feasibility Study, TSG 1999.

Software Development Firm (US$/month)		

Note: Not based on survey, but on subsequent consultations with industry experts

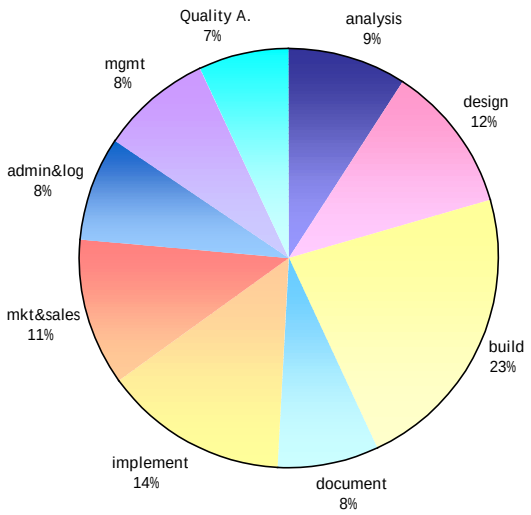
Large Employee Involvement in Software

Most responding firms indicate high percentages of their employees involved in software. Only three firms allocate less than 50% of their employees to software activities. Seven firms (30.4%) indicate that all their employees work in software; three more indicate 90-95 percent. On average, about 75 percent of employees are involved in software (as opposed to hardware or other) activities. This is not surprising, given the fact that firms chosen for the survey were known to be concentrated on software development.

Even Distribution of Human Resources Among Key Activities

As seen in Figure 2, on average, firms distribute employee work effort relatively evenly across major categories of work (analysis, design, build, documentation, implementation, marketing & sales, administration & logistics, management, and quality assurance). Building, implementation, and design receive relatively greater allocations, while quality assurance and management receive the least. Approximately 11 percent of human resource effort is focused on marketing and sales.

Figure 2: Breakdown of Human Resource Allocation



Skills Gaps Exist

The following lists responses made to the question "What is the major skill gaps now and in the future? Number and types of workers/skills currently required":

Ongoing requirements for technical software developers;
(Skills) in data communication;
Multimedia and data programming skills;
The lack of trainers and development specialists is a large obstacle;

Mainly IT professionals;
Web enabling applications development 2 employees, web application experience, web communications experience;
2 java programmers, 2 visual basic programmers, 2 windows NT engineers;
Dynamic reporting tools 3, graphics output 3, web enabling for our systems 5, analysis and design 3, business processes 2;
Technical writer 1, programmer 2;
Middle management, executive secretary;
Web development (applications) java 3, visual C++ 5;
Java programmers 1, DBA 1;
Good programmers 3, SW leaders 2;
Implementation planning & execution, marketing-- especially export marketing, distributed database management, web technology & web based database systems;
Learning new languages & techniques. We have 28 full time people and 13 subcontractors and/or part timers. We need to employ at least 10 more within 12 months. Major training need is JAVA;
Major and persistent gaps in the fresh graduate population, we rely totally on our own internal training to close these gaps;
Certified ENG, software developers.

D.8 Facilities and Financing Issues

Small Office Facilities

Respondents indicate current facilities size ranging from 105 m2 to 850 m2, with an average of 325 m2.

Majority Have Expansion Plans

Of 19 firms responding to the question concerning pending expansion, 12 (63%) answered affirmatively. The average current space size of those saying they plan to expand is 242 m2 (about 25% below the average current size for all respondents-- see above). The average future space specified by those planning to expand, on average, is just over 400 m2.

Financing Limited to Commercial Credit

Firms indicate that banks provide only commercial credit. None indicate the presence of venture capital or loans directed toward IT software activities.

D.9 Summary and Conclusions

While the survey suffered from various limitations due to time and the inability to conduct larger numbers of direct interviews, it has produced a valuable snap-shot of Jordan's nascent IT industry. Along with other sources of information presented in the main report, the survey allows for important comparisons with other IT countries in the region and beyond.

In the future, additional surveys may be carried out in a more rigorous fashion. Ideally, this can be done after a period of time (say, one year) so that growth and change can be appreciated subsequent to the REACH strategy implementation.

Annex E

FISCAL AND ECONOMIC IMPACT ANALYSIS

E.1 INTRODUCTION

This annex provides a preliminary estimation of the overall economic and fiscal impact of implementing the proposed REACH IT sector development strategy, including liberalizing taxes and duties on IT products and services in Jordan[10]. It provides projections for IT-related jobs and exports for the next 5 years (1999-2004). It also includes estimates of the costs and benefits associated with reducing customs duties on IT hardware and software. It projects fiscal impacts caused by a reduction in corporate and sales taxes for IT software development firms. The analysis is based on data gathered by the REACH-AMIR consultants in Jordan and in the United States. The results of the analysis are preliminary and very approximate, due to time and data constraints. However, they provide an indication of the potential benefits of implementing the REACH initiative's recommended actions.

E.2 SUMMARY OF FINDINGS

The analyses indicate that the Kingdom of Jordan stands to enjoy significant economic and fiscal benefits from a concerted effort at liberalizing and supporting its emergent IT sector.

IT-related jobs are projected to grow from the current level of approximately 8,000 to over 30,000 by 2004.

Exports of software and IT services are projected to grow from the 1998 level of approximately US$11 million to over $550 million by 2004.

The projected net fiscal impact of implementing the proposed fiscal changes is highlighted in Table E1. Depending on the assumptions used, the estimated fiscal impact is slightly negative to strongly positive, as described below. The overall impact on the GoJ budget is very small, given the very small size and fiscal impact of the IT sector presently.

Table E1: Projected Ranges of Net Fiscal Impact Due to IT Sector Liberalization, 2000-2003 (US$)

	Range of Impact
1999	-2.5 million to +532 thousand
2000	-4.3 million to +2 million
2001	-3.4 million to +4.6 million
2002	-2.3 million to +8.8 million
2003	-500 thousand to +15.2 million

E.3 METHODOLOGY

The **employment projections** were based on a simple spread sheet model which included projections of numbers of companies, coupled with corresponding average company size projections. Factors were included for indirect employment. Starting point assumptions were based on current firm numbers and average number of employees as revealed by the recent IT sector survey (see Annex B).
Export projections were also based on a simple spread sheet model, starting with export levels reported in 1998, along with conservative assumptions in terms of unreported exports. Export growth levels were the principal independent variable in this model—historical growth figures were used, but scaled down linearly to add a measure of conservatism.

The **fiscal impact** analysis estimates the benefits and costs of the liberalization of import duties, sales and corporate taxes for IT products and services. A spreadsheet model provides estimations based on various assumptions and scenarios, as described below.

[10] This annex was prepared by Vince Ruddy, TSG, drawing upon inputs developed by Claude Baissac, TSG.

The exchange rate used for the analysis and simulation is set at US$1.47 per Jordanian Dinar.

E.4 EMPLOYMENT PROJECTIONS

Tables E2 and E3 present the spread sheet model reflecting projections and assumptions for employment generated by IT sector growth. As seen in these tables, a number of reasonable assumptions lead to the conclusion that employment growth will be quite robust. Indirect job generation is assumed at only 50% of direct jobs, a conservative assumption considering 100% figures used for other industry sectors. Private sector jobs are projected to more than quadruple in 5 years time, as the number of software and hardware firms increases according to the assumed profile. Figure E1 provides a graphical representation of the overall trajectory of IT-related job growth.

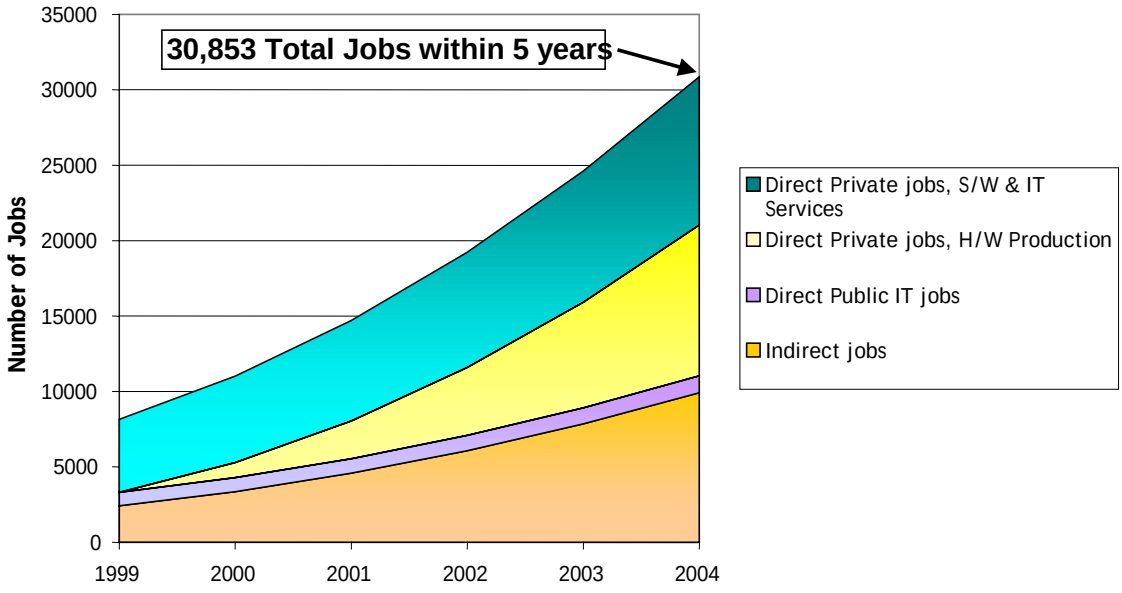
Table E2: Employment Projections for IT Sector Strategy

	1999	2000	2001	2002	2003	2004
Private Sector						
Local s/w developers & IT service providers						
Direct	1250	1539	1856	2201	2574	2975
Indirect	625	770	928	1101	1287	1488
Sub-total	1875	2309	2784	3302	3861	4463
Local h/w & s/w re-sellers & related service providers						
Direct	3500	3960	4440	4940	5460	6000
Indirect	1750	1980	2220	2470	2730	3000
Sub-total	5250	5940	6660	7410	8190	9000
Foreign s/w developers & IT service providers						
Direct	100	216	348	496	660	840
Indirect	50	108	174	248	330	420
Sub-total	150	324	522	744	990	1260
Sub-total, all of above	7275	8573	9966	11456	13041	14723
Foreign h/w production						
Direct	0	1000	2500	4500	7000	10000
Indirect	0	500	1250	2250	3500	5000
Sub-total	0	1500	3750	6750	10500	15000
Sub-total, private IT industry	7275	10073	13716	18206	23541	29723
Public Sector						
National Information Center	15	15	15	15	15	15
Royal Scientific Society	20	20	20	20	20	20
Other Government/Public Entities	858	901	946	993	1043	1095
Sub-total, public IT	893	936	981	1028	1078	1130
TOTAL IT-GENERATED EMPLOYMENT	8168	11008	14697	19234	24619	30853

Table E3: Assumptions for Employment Projections

	1999	2000	2001	2002	2003	2004
Local Software/IT Services						
Number of companies	50	57	64	71	78	85
Average jobs/company	25	27	29	31	33	35
Local Hardware						
Number of companies	350	360	370	380	390	400
Average jobs/company	10	11	12	13	14	15
Foreign Software/IT Services						
Number of companies	2	4	6	8	10	12
Average jobs/company	50	54	58	62	66	70
Foreign Hardware						
Number of companies	0	1	2	3	4	5
Average jobs/company		1000	1250	1500	1750	2000
Indirect: Direct Job Ratio, Private Sector	0.5					
Indirect: Direct Job Ratio, Public Sector	0					
Other Gov't/Public Entities Jobs Estimate						
Public Universities	356	Includes professors				
2-year Colleges	182	Includes professors				
21 Ministries + Prime Minister's Office	110	(Based on assumed avg. of 5/ministry)				
Central Bank	10					
Royal Jordanian Airlines	200					

Figure E1: Projected IT-Related Employment by Sub-Sector



Sub-total	858	(Assumed to grow at 5% until 2004)	

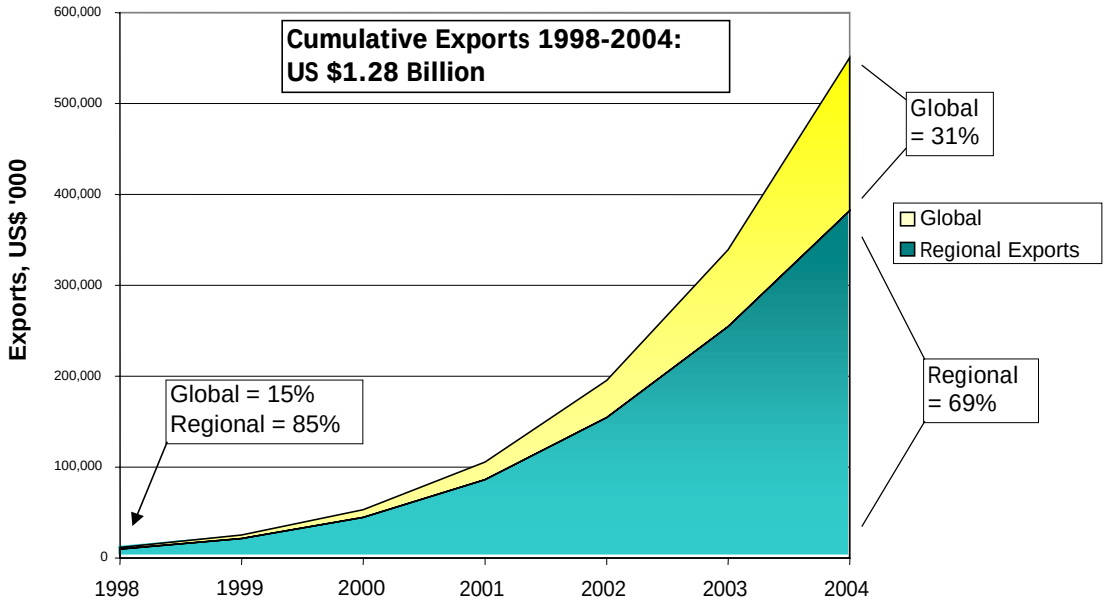
E.5 EXPORT PROJECTIONS

Table E5 presents the spreadsheet model used for export projections. As seen in this table, exports could grow to as high as US$550million within 5 years, even if currently high export growth levels taper off over time, as assumed in the model. Cumulative exports between 1998 and 2004 are projected at US$ 1.28 Billion. By the year 2004, the mix of global vs. regional exports is expected to change to 31% and 69% respectively (currently at 15% and 85%). Figure E3 provides a graphic representation of export growth profile over the next 5 years.

Table E4: Export Growth Projections and Assumptions

	1998	1999	2000	2001	2002	2003	2004	%'s 2004
Export Projections (US$ '000s)								
Regional Exports	9,534	21,292	44,430	86,195	154,576	254,535	381,802	69%
Global	1,682	3,898	8,783	19,234	40,905	84,401	168,801	31%
Total	11,216	25,190	53,213	105,429	195,481	338,935	550,604	100%
Cumulative 1998-2004:	11,216	36,407	89,620	195,049	390,529	729,465	1,280,068	
Starting Points & Assumptions								
Total '98 Exports Reported by Survey 1	2113							
Additional '98 Exports revealed by Survey 2	2979							
Additional '98 Exports revealed by Survey 3	2386							
Sub-total	7478							
Assumed Exports unreported, % of sub-total	50%							
Assumed unreported exports	3739							
Total Estimated Exports 1998	11216							
% of Exports going to regional mkt.	85%							
% of Exports going to global mkt.	15%							
Annual Growth of Regional Exports	138%	123%	109%	94%	79%	65%	50%	85.0%
Annual Growth of Global Exports	138%	132%	125%	119%	113%	106%	100%	115.6%

Figure E2: Projected S/W & IT Service Exports, 1999-2000



E.6 FISCAL IMPACT

The following provides a rough indication of the net impact on the Government budget from implementing the proposals in the REACH strategy.

A number of scenarios were tested:

- Reduction of import duties on IT-related equipment
- Impact on sales taxes from the import liberalization
- Impact on personal income collections
- Impact on corporate income tax collections
- Net fiscal impact combining all the above effects

Scenario 1: Impact on Import Duty Collections

One of the proposed measures is zero-duties on all imports of IT-related equipment. We estimated the impact of this on customs duty collections from levels existing prior to the August 1, 1999 (i.e., 10% tariff on IT hardware and 35% on software).

Table E5: Estimated Customs Duty Revenue Losses

	Customs revenues foregone	Share of total tax revenues
1998	-	-
1999	US$4,792,700	0.46%
2000	US$5,271,167	0.38%
2001	US$5,799,167	0.39%
2002	US$6,379,084	0.41%
2003	US$7,016,992	0.44%

The main assumptions underlying this scenario are the following:

- Without duty liberalization, import flows would increase by 10% annually (base case)
- With duty liberalization, there is no duty collection on IT hardware or software
- Duty liberalization is assumed to start at the beginning of 1999, not on August 1, 1999. This represents a conservative assumption

As seen in Table E5, the foregone revenue owing to IT duty liberalization estimated based on these assumptions ranges from US$4.8 million in 1999, to US$7 million in 2003. This represents less than 0.5% of overall government revenues, and is more than compensated for by increased revenues as shown below.

Scenario 2: Impact on Sales Tax Collections

International experience suggests that reductions in tariff levels lead to significant increases in import volumes. We estimate that such a reduction in Jordan will cause a 15-20% increase in prevailing import levels. This is a reasonable assumption which reflects the price-demand elasticity of IT hardware and software. Import liberalization also reduces the incentive for smuggling. We assume, as a resut, that the reduction in smuggling will result in a further increase in import volumes of IT products and equipment of between 25% and 35%. This is referred to as the "anti-smuggling effect". Additionally, for the purpose of our analysis, sales figures upon which sales tax calculations are based are estimated to be import values plus 25%. Exports and local sales of locally produced s/w are also estimated and included. General Sales tax was assumed at 13%. Based on these assumptions, four different cases were run:

Case 1: Imports elasticity of 15%; anti-smuggling effect of 25%

- Case 2: Imports elasticity of 15%; anti-smuggling effect of 35%
- Case 3: Imports elasticity of 20%; anti-smuggling effect of 25%
- Case 4: Imports elasticity of 20%; anti-smuggling effect of 35%

As seen in Table E6, the extra sales tax generated by import liberalization is significant, ranging from US$3.0 million to US$4.3 million in 1999, and US$4.4 million to US$6.3 million in 2003.

Table E6: Projected Increases in Sales Tax Revenues caused by Import Liberalization (US$)

	Additional sales tax revenues - Case 1	Additional sales tax revenues - Case 2	Additional sales tax revenues - Case 3	Additional sales tax revenues - Case 4
1999	3,016,295	3,809,149	3,447,194	4,274,520
2000	3,317,924	4,190,064	3,791,913	4,701,972
2001	3,649,716	4,609,070	4,171,104	5,172,170
2002	4,014,688	5,069,977	4,588,215	5,689,386
2003	4,416,157	5,576,975	5,047,036	6,258,325

Scenario 3: Impact on Personal Income Tax Collections

The model projects additional personal income tax collections due to growing numbers of jobs in the IT sector. The main assumptions are:

- Numbers of jobs based on employment projections presented in Table E1.
- Average wages based on figures obtained from IT firm survey, increased at 5% annually.
- Tax rates based on Jordanian tax code and corresponding wage categories (see Table EA-12)

Table E7: Estimated Personal Income Tax Revenue Impact

	Additional Personal Income tax revenues
1999	US$0
2000	US$540,611
2001	US$1,304,976
2002	US$2,322,394
2003	US$3,625,157

As seen in Table E7, personal income tax stimulation is not as great as sales tax stimulation, but it is still significant, ranging from US$541 thousand in 1999 to US$3.6 million in 2003.

Scenario 4: Impact on Corporate Income Tax Collections

Implementation of the REACH strategy shall have a small impact on total corporate income tax revenues of the Jordanian Government. The main assumptions utilized in this scenario are that:

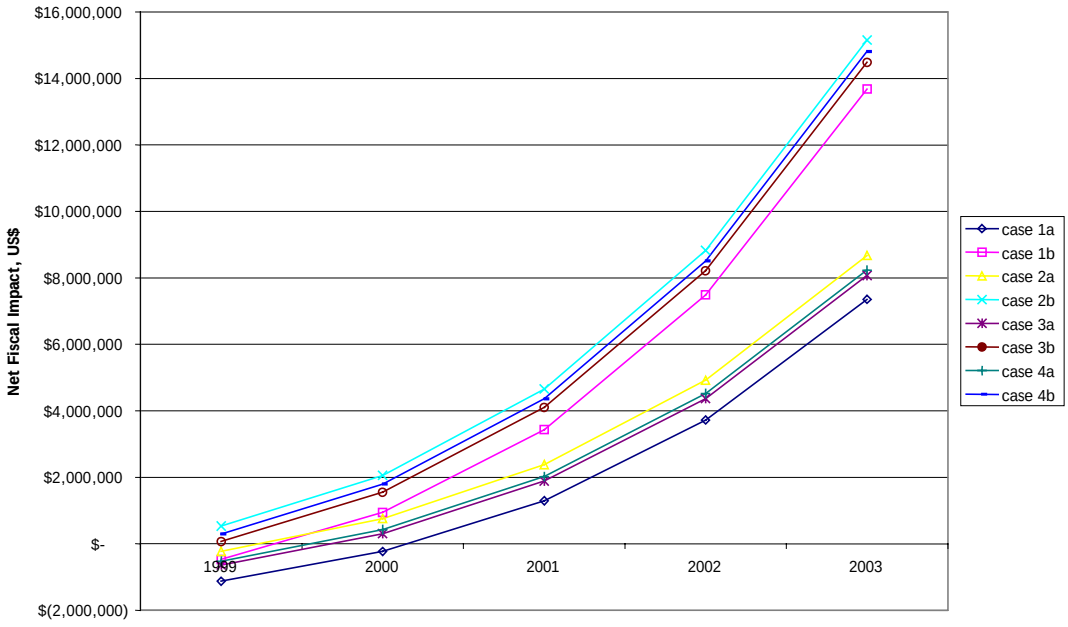
- Total company profits are based on total sales volumes (see assumptions under Table E6) plus 5% (cases 1a, 2a, 3a, and 4a) to 10% (cases 1b, 2b, 3b, and 4b)
- Profits of individual companies decrease over time, due to number of companies which increases faster than sales on a percentage basis
- Corporate tax rate of 35% is applied in base case; full tax collection is assumed on incremental corporate tax revenue net of base case

As seen in Table E16, liberalization and REACH are projected to result in significant increase of corporate tax collections. On the basis of the different and profit assumptions (5 or 10% applied to cases 1 through 4), additional corporate tax collections range from US$651 thousand to US$820 thousand in 1999; and US$6.3 million to US$6.6 million in 2003.

Scenario 5: Net Fiscal Impact

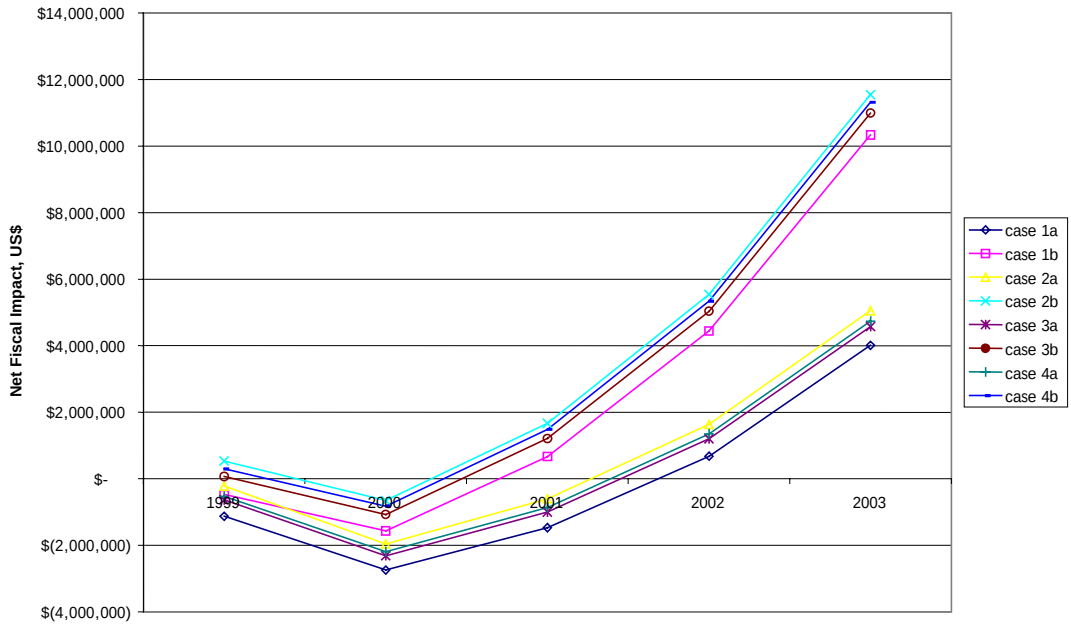
When the previous scenarios are combined, the total projected fiscal impact varies over time and according to case, as shown graphically in Figure E3. As seen in this figure, the analysis projects that the net fiscal impact of zeroeing import duties becomes positive by the year 2000 in all but the most conservative case. By 2001, all cases show positive fiscal impact.

Figure E3: Range of Projected Fiscal Impact, IT Sector Liberalization & Support Zero Duties, 35% Corporate Taxes, 13% General Sales Tax



Impact of Lowering Sales Tax to 10%. The model also was used to project the impact of lowering the sales tax rate from its current level of 13% to 10% at the beginning of the year 2000. Figure E4 shows the range of projected fiscal impact results based on this assumption. As seen in the figure, net fiscal impact is projected to be positive for half the cases by 2001 and for all cases by 2002. In the worst case, the total net fiscal losses projected over the first 2 years amounts to only $4.2 million. However, this is more than recovered over the next two years, when surpluses are predicted—even in the worst case scenario.[11]

Figure E4: Range of Projected Fiscal Impact, IT Sector Liberalization & Support
Zero Duties, 10% General Sales Tax, 35% Corporate Tax Rate

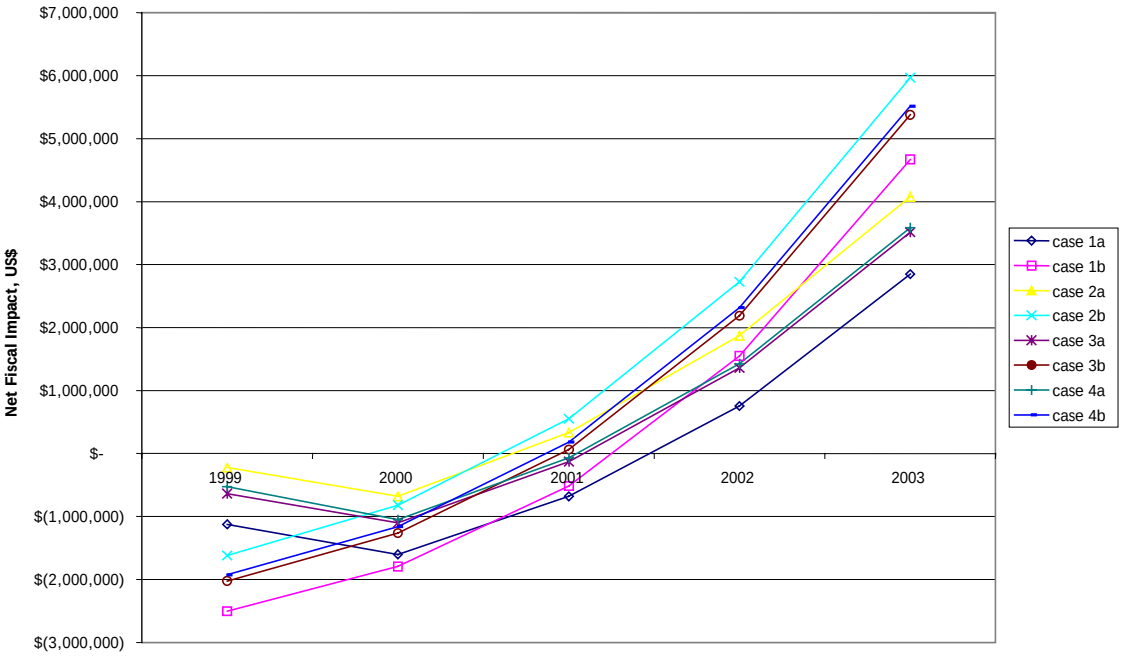


Impact of Lowered Corporate Tax. Similarly, the model was used to project impacts of lowered corporate tax rates in addition to the zero duty conditions[12]. By changing the assumed corporate tax for software and IT services companies from 35% to 15%, the range of impacts shown in Figure E5 are produced. As seen in Figure E5, net fiscal impact under these conditions is projected to become positive for half the cases in year 2001, and for all cases by year 2002.

[11] The same assumptions listed under Table E6 were applied, with the exception of assumption 4, since the sales tax rate was adjusted to 10% starting in year 2000.

[12] The main assumptions are: Corporate taxes lowered from 35% present rate to 15% in the year 2000 and onward. Same tax rates apply regardless of whether firm produces own software/hardware, or simply imports and resells (a conservative assumption). All other assumptions assumed for zero duty cases left the same.

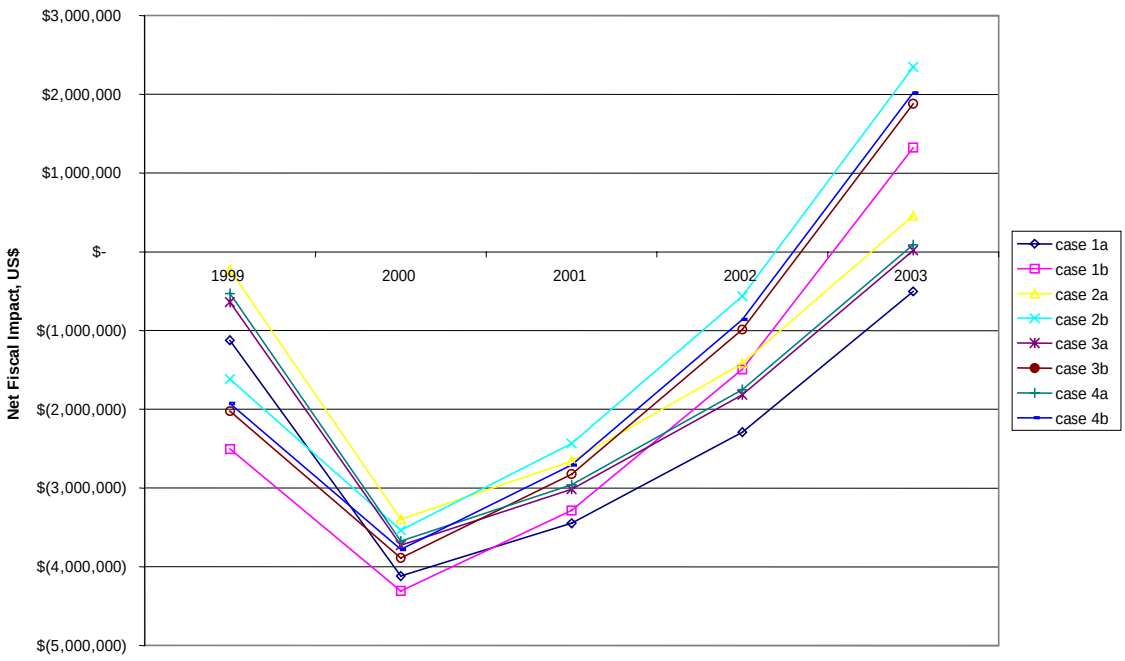
Figure E5: Range of Projected Fiscal Impact, IT Sector Liberalization & Support
Zero Duties as of 1999; 2000 & onward: 15% Corporate Tax Rate, 13% General Sales Tax



All Effects Together: As seen in Figure E6, if we combine all effects together—zero import duties, 15% corporate taxes, 10% sales taxes, the model projects a net fiscal impact that will become positive for all but the worst case by the year 2003[13]. By 2004, all cases are projected to produce fiscal surpluses. While this is the most extreme case modelled, it is also the one likely to result in economic stimulation and IT sector growth in excess of that captured by the simulation.

[13] All assumptions corresponding to the scenarios listed above apply. Sales tax modelled at 10% from year 2000 onward. Corporate taxes for all IT firms, including re-sellers, assumed at 15% from year 2000 onward.

Figure E6: Range of Projected Fiscal Impact, IT Sector Liberalization & Support
Zero Duties in 1999; 2000 and onward:15% Corporate Tax Rate & 10% General Sales Tax



Additional benefits. Stricter enforcement of property rights laws and increased efficiency of customs procedures will also lead toward a reduction of smuggling. In addition, these policy changes will render illegal copying of software more difficult, leading to a transfer of activities from the underground to the legitimate economy. This increase will be positively reflected in recorded sales and will result in increased sales tax receipts.

Although not quantified in this analysis for the reasons mentioned above, a decrease in corporate tax for software development firms, currently taxed at 35%, to 15% with a 10 year holiday - thereby putting them on par with hardware firms - will likely result in a significant increase in firms creation, with the positive effect on sales tax revenues. Further research is required in this domain.

E.7 CONCLUSIONS

The benefits of liberalization and full REACH strategy implementation far outweigh the costs. Foregone import duties due to the already implemented zero duty policy on IT goods will be more than compensated by stimulated increases in sales tax, personal income tax, and corporate taxes. Lowering sales and corporate taxes to 10 and 15% respectively is feasible and will substantially increase the likelihood of Jordan's IT success.

It is recommended that the Government of Jordan maintain the zero IT product tariff duties promulgated on August 1, 1999 as a key element of its efforts. As demonstrated by the simulation, it is extremely likely that the significant decrease of duties, particularly on software applications and media, will result in the rapid growth of imports of hardware and software.

The Government should decrease sales tax to 10% on IT products and services. Other fees and charges outside of this general sales tax should be eliminated.

It should also lower corporate taxes for IT companies to 15%. In order to minimize adverse fiscal impacts, this tax treatment should only apply to activities involving software development and similar IT services, but not to simple re-selling of IT hardware and software (even though these were modelled in our analysis, for purposes of being conservative). Appropriate rules and definitions that would allow this distinction and facilitate effective revenue collection should be elaborated and adopted.

Table E8: Imports volume growth and customs duties revenues, 1998-2003. Projection of duties decrease on Government tax revenues.

	Imports volume	Duties		Duty revenues		Total tax revenues		Duties share	
	Base case	1998	1999	Base case	1999 duty rate (Case 2)	Base case	Case 2	Base case	Case 2
1998									
Hardware:	$ 36,570,000	10%	-	$ 3,657,000	-				
Software:	$ 2,000,000	35%	-	$ 700,000	-				
Total:	**$ 38,570,000**			**$ 4,357,000**	-	$ 950,800,000	-	0.46%	-
1999									
Hardware:	$ 40,227,000	10%	0%	$ 4,022,700	$ -				
Software:	$ 2,200,000	35%	0%	$ 770,000	$ -				
Total:	**$ 42,427,000**			**$ 4,792,700**	$ -	$ 1,270,000,000	$ 1,265,207,300	0.38%	0.00%
2000									
Hardware:	$ 44,249,700	10%	0%	$ 4,424,970	$ -				
Software:	$ 2,420,000	35%	0%	$ 847,000	$ -				
Total:	**$ 46,669,700**			**$ 5,271,970**	$ -	$ 1,335,000,000	$ 1,329,728,030	0.39%	0%
2001									
Hardware:	$ 48,674,670	10%	0%	$ 4,867,467	$ -				

Software:	$ 2,662,000	35%	0%	$ 931,700	$ -				
Total:	**$ 51,336,670**			**$ 5,799,167**	$ -	$ 1,411,000,000	$ 1,405,200,833	0.41%	0%
2002									
Hardware:	$ 53,542,137	10%	0%	$ 5,354,214	$ -				
Software:	$ 2,928,200	35%	0%	$ 1,024,870	$ -				
Total:	**$ 56,470,337**			**$ 6,379,084**	$ -	$ 1,495,000,000	$ 1,488,620,916	0.43%	0%
2003									
Hardware:	$ 58,896,351	10%	0%	$ 5,889,635	$ -				
Software:	$ 3,221,020	35%	0%	$ 1,127,357	$ -				
Total:	**$ 62,117,371**			**$ 7,016,992**	$ -	$ 1,592,000,000	$ 1,584,983,008	0.44%	0%

Table E9: Post-duties decrease sales tax revenues, based on estimated of imports elasticity, 1998-2003.

	Imports vol. Base case	**Imports vol. 15% elasticity**	**Sales vol. 25% mark-up**	**Sales tax**	**Sales tax rev.**	**Imports vol. 20% elasticity**	**Sales vol. 25% mark-up**	**Sales tax rev.**
1998								
Hardware:	$ 36,570,000	-	$ 45,712,500	13%	$ 5,942,625	-		
Software:	$ 2,000,000	-	$ 2,500,000	13%	$ 325,000	-		

Total:	$ 38,570,000	-	$ 48,212,500	13%	$ 6,267,625	-

1999								
Hardware:	$ 40,227,000	$ 46,261,050	$ 57,826,313	13%	$ 7,517,421	$ 48,272,400	$ 60,340,500	$ 7,844,265
Software:	$ 2,200,000	$ 2,530,000	$ 3,162,500	13%	$ 411,125	$ 2,640,000	$ 3,300,000	$ 429,000
Total:	$ 42,427,000	$ 48,791,050	$ 60,988,813	13%	**$ 7,928,546**	$ 50,912,400	$ 63,640,500	**$ 8,273,265**

2000								
Hardware:	$ 44,249,700	$ 50,887,155	$ 63,608,944	13%	$ 8,269,163	$ 53,099,640	$ 66,374,550	$ 8,628,692
Software:	$ 2,420,000	$ 2,783,000	$ 3,478,750	13%	$ 452,238	$ 2,904,000	$ 3,630,000	$ 471,900
Total:	$ 46,669,700	$ 53,670,155	$ 67,087,694	13%	**$ 8,721,400**	$ 56,003,640	$ 70,004,550	**$ 9,100,592**

2001								
Hardware:	$ 48,674,670	$ 55,975,871	$ 69,969,838	13%	$ 9,096,079	$ 58,409,604	$ 73,012,005	$ 9,491,561
Software:	$ 2,662,000	$ 3,061,300	$ 3,826,625	13%	$ 497,461	$ 3,194,400	$ 3,993,000	$ 519,090
Total:	$ 51,336,670	$ 59,037,171	$ 73,796,463	13%	**$ 9,593,540**	$ 61,604,004	$ 77,005,005	**$ 10,010,651**

2002								
Hardware:	$ 53,542,137	$ 61,573,458	$ 76,966,822	13%	$ 10,005,687	$ 64,250,564	$ 80,313,206	$ 10,440,717
Software:	$ 2,928,200	$ 3,367,430	$ 4,209,288	13%	$ 547,207	$ 3,513,840	$ 4,392,300	$ 570,999

Total:	$ 56,470,337	$ 64,940,888	$ 81,176,109	13%	**$ 10,552,894**	$ 67,764,404	$ 84,705,506	**$ 11,011,716**

2003								
Hardware:	$ 58,896,351	$ 67,730,803	$ 84,663,504	13%	$ 11,006,256	$ 70,675,621	$ 88,344,526	$ 11,484,788
Software:	$ 3,221,020	$ 3,704,173	$ 4,630,216	13%	$ 601,928	$ 3,865,224	$ 4,831,530	$ 628,099
Total:	$ 62,117,371	$ 71,434,976	$ 89,293,720	13%	**$ 11,608,184**	$ 74,540,845	$ 93,176,056	**$ 12,112,887**

Table E10: Balance of sales tax revenues and import duties losses, based on estimated of imports elasticity, 1998-2003.

	Loss to new duties	**Sales tax rev. Elast. at 15%**	**Revenue loss**	**Sales tax rev. Elast. at 20%**	**Revenue loss**
1998					
Hardware:	-	$ 5,942,625			
Software:	-	$ 325,000			
Total:	**-**	$ 6,267,625			
1999					
Hardware:	$ 4,022,700	$ 7,517,421	$ (3,494,721)	$ 7,844,265	$ (3,821,565)
Software:	$ 770,000	$ 411,125	$ 358,875	$ 429,000	$ 341,000
Total:	$ 4,792,700	$ 7,928,546	**$ (3,135,846)**	$ 8,273,265	**$ (3,480,565)**
2000					

Hardware:	$ 4,424,970	$ 8,269,163	$ (3,844,193)	$ 8,628,692	$ (4,203,722)
Software:	$ 847,000	$ 452,238	$ 394,763	$ 471,900	$ 375,100
Total:	$ 5,271,970	$ 8,721,400	**$ (3,449,430)**	$ 9,100,592	**$ (3,828,622)**

2001					
Hardware:	$ 4,867,467	$ 9,096,079	$ (4,228,612)	$ 9,491,561	$ (4,624,094)
Software:	$ 931,700	$ 497,461	$ 434,239	$ 519,090	$ 412,610
Total:	$ 5,799,167	$ 9,593,540	**$ (3,794,373)**	$ 10,010,651	**$ (4,211,484)**

2002					
Hardware:	$ 5,354,214	$ 10,005,687	$ (4,651,473)	$ 10,440,717	$ (5,086,503)
Software:	$ 1,024,870	$ 547,207	$ 477,663	$ 570,999	$ 453,871
Total:	$ 6,379,084	$ 10,552,894	**$ (4,173,811)**	$ 11,011,716	**$ (4,632,632)**

2003					
Hardware:	$ 5,889,635	$ 11,006,256	$ (5,116,620)	$ 11,484,788	$ (5,595,153)
Software:	$ 1,127,357	$ 601,928	$ 525,429	$ 628,099	$ 499,258
Total:	$ 7,016,992	$ 11,608,184	**$ (4,591,192)**	$ 12,112,887	**$ (5,095,895)**

Table E11: Post-duties decrease imports expansion, based on estimates of imports elasticity and smuggling diminution, 1998-2003.

	Imports vol.	**Imports vol. 15% elasticity**	**Imports vol. 25% growth Case 1**	**Imports vol. 35% growth Case 2**	**Imports vol. 20% elasticity**	**Imports vol. 25% growth Case 3**	**Imports vol. 35% grwoth Case 4**
1998							
Hardware:	$ 36,570,000						
Software:	$ 2,000,000						
Total:	$ 38,570,000						
1999							
Hardware:	$ 40,227,000	$ 46,261,050	$ 57,826,313	$ 62,452,418	$ 48,272,400	$ 60,340,500	$ 65,167,740
Software:	$ 2,200,000	$ 2,530,000	$ 3,162,500	$ 3,415,500	$ 2,640,000	$ 3,300,000	$ 3,564,000
Total:	$ 42,427,000	$ 48,791,050	**$ 60,988,813**	**$ 65,867,918**	$ 50,912,400	**$ 63,640,500**	**$ 68,731,740**
2000							
Hardware:	$ 44,249,700	$ 50,887,155	$ 63,608,944	$ 68,697,659	$ 53,099,640	$ 66,374,550	$ 71,684,514
Software:	$ 2,420,000	$ 2,783,000	$ 3,478,750	$ 3,757,050	$ 2,904,000	$ 3,630,000	$ 3,920,400
Total:	$ 46,669,700	$ 53,670,155	**$ 67,087,694**	**$ 72,454,709**	$ 56,003,640	**$ 70,004,550**	**$ 75,604,914**
2001							
Hardware:	$ 48,674,670	$ 55,975,871	$ 69,969,838	$ 75,567,425	$ 58,409,604	$ 73,012,005	$ 78,852,965
Software:	$ 2,662,000	$ 3,061,300	$ 3,826,625	$ 4,132,755	$ 3,194,400	$ 3,993,000	$ 4,312,440

Total:	$ 51,336,670	$ 59,037,171	**$ 73,796,463**	**$ 79,700,180**	$ 61,604,004	**$ 77,005,005**	**$ 83,165,405**
2002							
Hardware:	$ 53,542,137	$ 61,573,458	$ 76,966,822	$ 83,124,168	$ 64,250,564	$ 80,313,206	$ 86,738,262
Software:	$ 2,928,200	$ 3,367,430	$ 4,209,288	$ 4,546,031	$ 3,513,840	$ 4,392,300	$ 4,743,684
Total:	$ 56,470,337	$ 64,940,888	**$ 81,176,109**	**$ 87,670,198**	$ 67,764,404	**$ 84,705,506**	**$ 91,481,946**
2003							
Hardware:	$ 58,896,351	$ 67,730,803	$ 84,663,504	$ 91,436,584	$ 70,675,621	$ 88,344,526	$ 95,412,088
Software:	$ 3,221,020	$ 3,704,173	$ 4,630,216	$ 5,000,634	$ 3,865,224	$ 4,831,530	$ 5,218,052
Total:	$ 62,117,371	$ 71,434,976	**$ 89,293,720**	**$ 96,437,218**	$ 74,540,845	**$ 93,176,056**	**$ 100,630,141**

Table E12: Sales tax revenues, 1998-2003.

	Imports vol. Case 1	**Sales vol. 25% mark-up**	**Sales tax revenues Case 1**	**Imports vol. Case 2**	**Sales vol. 25% mark-up**	**Sales tax revenues Case 2**
1999						
Hardware:	$ 57,826,313	$ 72,282,891	$ 9,396,776	$ 62,452,418	$ 78,065,522	$ 10,148,518

Software:	$ 3,162,500	$ 3,953,125	$ 513,906	$ 3,415,500	$ 4,269,375	$ 555,019
Total:	$ 60,988,813	$ 76,236,016	**$ 9,910,682**	$ 65,867,918	$ 82,334,897	**$ 10,703,537**
2000						
Hardware:	$ 63,608,944	$ 79,511,180	$ 10,336,453	$ 68,697,659	$ 85,872,074	$ 11,163,370
Software:	$ 3,478,750	$ 4,348,438	$ 565,297	$ 3,757,050	$ 4,696,313	$ 610,521
Total:	$ 67,087,694	$ 83,859,617	**$ 10,901,750**	$ 72,454,709	$ 90,568,387	**$ 11,773,890**
2001						
Hardware:	$ 69,969,838	$ 87,462,298	$ 11,370,099	$ 75,567,425	$ 94,459,281	$ 12,279,707
Software:	$ 3,826,625	$ 4,783,281	$ 621,827	$ 4,132,755	$ 5,165,944	$ 671,573
Total:	$ 73,796,463	$ 92,245,579	**$ 11,991,925**	$ 79,700,180	$ 99,625,225	**$ 12,951,279**
2002						
Hardware:	$ 76,966,822	$ 96,208,527	$ 12,507,109	$ 83,124,168	$ 103,905,210	$ 13,507,677
Software:	$ 4,209,288	$ 5,261,609	$ 684,009	$ 4,546,031	$ 5,682,538	$ 738,730
Total:	$ 81,176,109	$ 101,470,137	**$ 13,191,118**	$ 87,670,198	$ 109,587,748	**$ 14,246,407**
2003						
Hardware:	$ 84,663,504	$ 105,829,380	$ 13,757,819	$ 91,436,584	$ 114,295,731	$ 14,858,445

Software:	$ 4,630,216	$ 5,787,770	$ 752,410	$ 5,000,634	$ 6,250,792	$ 812,603
Total:	$ 89,293,720	$ 111,617,150	**$ 14,510,230**	$ 96,437,218	$ 120,546,523	**$ 15,671,048**

Table E13: Sales tax revenues

	Import vol. Case 3	Sales vol. 25% mark-up	Sales tax revenue Case 3	Imports vol. Case 4	Sales vol. 25% mark-up	Sales tax revenues Case 4
1999						
Hardware:	$ 60,340,500	$ 75,425,625	$ 9,805,331.25	$ 65,167,740	$ 81,459,675	$ 10,589,758
Software:	$ 3,300,000	$ 4,125,000	$ 536,250	$ 3,564,000	$ 4,455,000	$ 579,150
Total:	$ 63,640,500	$ 79,550,625	**$ 10,341,581.25**	$ 68,731,740	$ 85,914,675	**$ 11,168,908**
2000						
Hardware:	$ 66,374,550	$ 82,968,188	$ 10,785,864.38	$ 71,684,514	$ 89,605,643	$ 11,648,734
Software:	$ 3,630,000	$ 4,537,500	$ 589,875	$ 3,920,400	$ 4,900,500	$ 637,065
Total:	$ 70,004,550	$ 87,505,688	**$ 11,375,739.38**	$ 75,604,914	$ 94,506,143	**$ 12,285,799**
2001						
Hardware:	$ 73,012,005	$ 91,265,006	$ 11,864,450.81	$ 78,852,965	$ 98,566,207	$ 12,813,607
Software:	$ 3,993,000	$ 4,991,250	$ 648,863	$ 4,312,440	$ 5,390,550	$ 700,772

Total:	$ 77,005,005	$ 96,256,256	**$ 12,513,313.31**	$ 83,165,405	$ 103,956,757	**$ 13,514,378**
2002						
Hardware:	$ 80,313,206	$ 100,391,507	$ 13,050,895.89	$ 86,738,262	$ 108,422,827	$ 14,094,968
Software:	$ 4,392,300	$ 5,490,375	$ 713,749	$ 4,743,684	$ 5,929,605	$ 770,849
Total:	$ 84,705,506	$ 105,881,882	**$ 13,764,644.64**	$ 91,481,946	$ 114,352,432	**$ 14,865,816**
2003						
Hardware:	$ 88,344,526	$ 110,430,658	$ 14,355,985.48	$ 95,412,088	$ 119,265,110	$ 15,504,464
Software:	$ 4,831,530	$ 6,039,413	$ 785,124	$ 5,218,052	$ 6,522,566	$ 847,934
Total:	$ 93,176,056	$ 116,470,070	**$ 15,141,109.11**	$ 100,630,141	$ 125,787,676	**$ 16,352,398**

Table E14: Balance of base sales tax revenues and increase sales tax revenues.

Sales tax revenues	**Sales tax revenues**	**Revenues increase**	**Sales tax revenues**	**Sales tax revenues**	**Revenues increase**
Case 1	**Base case, 13%**	**Case 1**	**Case 2**	**Base case, 13%**	**Case 2**

1999						
Hardware:	$ 9,396,776	6,536,887.50	$ 2,859,888	$ 10,148,518	$ 6,536,888	$ 3,611,630

Software:	$ 513,906	357,500.00	$ 156,406	555,018.75	$ 357,500	$ 197,519
Total:	$ 9,910,682	6,894,387.50	**$ 3,016,295**	$ 10,703,537	$ 6,894,388	**$ 3,809,149**
2000						
Hardware:	$ 10,336,453	7,190,576.25	$ 3,145,877	$ 11,163,370	$ 7,190,576	$ 3,972,793
Software:	$ 565,297	393,250.00	$ 172,047	610,520.63	$ 393,250	$ 217,271
Total:	$ 10,901,750	7,583,826.25	**$ 3,317,924**	$ 11,773,890	$ 7,583,826	**$ 4,190,064**
2001						
Hardware:	$ 11,370,099	7,909,633.88	$ 3,460,465	$ 12,279,707	$ 7,909,634	$ 4,370,073
Software:	$ 621,827	432,575.00	$ 189,252	671,572.69	$ 432,575	$ 238,998
Total:	$ 11,991,925	$ 8,342,209	**$ 3,649,716**	$ 12,951,279	$ 8,342,209	**$ 4,609,070**
2002						
Hardware:	$ 12,507,109	8,700,597.26	$ 3,806,511	$ 13,507,677	$ 8,700,597	$ 4,807,080
Software:	$ 684,009	475,832.50	$ 208,177	738,729.96	$ 475,833	$ 262,897
Total:	$ 13,191,118	9,176,429.76	**$ 4,014,688**	$ 14,246,407	$ 9,176,430	**$ 5,069,977**
2003						
Hardware:	$ 13,757,819	9,570,656.99	$ 4,187,162	$ 14,858,445	$ 9,570,657	$ 5,287,788

Software:	$ 752,410	523,415.75	$ 228,994	812,602.95	$ 523,416	$ 289,187
Total:	$ 14,510,230	10,094,072.74	**$ 4,416,157**	$ 15,671,048	$ 10,094,073	**$ 5,576,975**

Table E14: Balance of base sales tax revenues and increase sales tax revenues (continued)

	Sales tax revenues Case 3	Sales tax revenues Base case, 13%	Revenues increase Case 3	Sales tax revenues Case 4	Sales tax revenues Base case, 13%	Revenues increase Case 4
1999						
Hardware:	$ 9,805,331	$ 6,536,888	$ 3,268,444	$ 10,589,758	$ 6,536,888	$ 4,052,870
Software:	$ 536,250	$ 357,500	$ 178,750	$ 579,150	$ 357,500	$ 221,650
Total:	$ 10,341,581	$ 6,894,388	**$ 3,447,194**	$ 11,168,908	$ 6,894,388	**$ 4,274,520**
2000						
Hardware:	$ 10,785,864	$ 7,190,576	$ 3,595,288	$ 11,648,734	$ 7,190,576	$ 4,458,157
Software:	$ 589,875	$ 393,250	$ 196,625	$ 637,065	$ 393,250	$ 243,815
Total:	$ 11,375,739	$ 7,583,826	**$ 3,791,913**	$ 12,285,799	$ 7,583,826	**$ 4,701,972**
2001						
Hardware:	$ 11,864,451	$ 7,909,634	$ 3,954,817	$ 12,813,607	$ 7,909,634	$ 4,903,973
Software:	$ 648,863	$ 432,575	$ 216,288	$ 700,772	$ 432,575	$ 268,197
		$ -				
		$				

		-				
Total:	$ 12,513,313	$ 8,342,209	**$ 4,171,104**	$ 13,514,378	$ 8,342,209	**$ 5,172,170**
2002						
Hardware:	$ 13,050,896	$ 8,700,597	$ 4,350,299	$ 14,094,968	$ 8,700,597	$ 5,394,370
Software:	$ 713,749	$ 475,833	$ 237,916	$ 770,849	$ 475,833	$ 295,016
Total:	$ 13,764,645	$ 9,176,430	**$ 4,588,215**	$ 14,865,816	$ 9,176,430	**$ 5,689,386**
2003						
Hardware:	$ 14,355,985	$ 9,570,657	$ 4,785,328	$ 15,504,464	$ 9,570,657	$ 5,933,807
Software:	$ 785,124	$ 523,416	$ 261,708	$ 847,934	$ 523,416	$ 324,518
Total:	$ 15,141,109	$ 10,094,073	**$ 5,047,036**	$ 16,352,398	$ 10,094,073	**$ 6,258,325**

Table E15: Balance of final incremental sales tax revenues and duties losses

Sales tax revenues Case 1	**Duties loss**	**Revenues balance Case 1**	**Sales tax revenues Case 2**	**Duties loss**	**Revenues balance Case 2**
1999					
Hardware	$	$	$	$	$

:	2,859,888	4,022,700	(1,162,812)	3,611,630	4,022,700	(411,070)
Software:	$ 156,406	$ 770,000	$ (613,594)	$ 197,519	$ 770,000	$ (572,481)
Total:	$ 3,016,295	$ 4,792,700	**$ (1,776,405)**	$ 3,809,149	$ 4,792,700	**$ (983,551)**
2000						
Hardware:	$ 3,145,877	$ 4,424,970	$ (1,279,093)	$ 3,972,793	$ 4,424,970	$ (452,177)
Software:	$ 172,047	$ 847,000	$ (674,953)	$ 217,271	$ 847,000	$ (629,729)
Total:	$ 3,317,924	$ 5,271,970	**$ (1,954,046)**	$ 4,190,064	$ 5,271,970	**$ (1,081,906)**
2001						
Hardware:	$ 3,460,465	$ 4,867,467	$ (1,407,002)	$ 4,370,073	$ 4,867,467	$ (497,394)
Software:	$ 189,252	$ 931,700	$ (742,448)	$ 238,998	$ 931,700	$ (692,702)
Total:	$ 3,649,716	$ 5,799,167	**$ (2,149,451)**	$ 4,609,070	$ 5,799,167	**$ (1,190,097)**
2002						
Hardware:	$ 3,806,511	$ 5,354,214	$ (1,547,702)	$ 4,807,080	$ 5,354,214	$ (547,134)
Software:	$ 208,177	$ 1,024,870	$ (816,693)	$ 262,897	$ 1,024,870	$ (761,973)
Total:	$ 4,014,688	$ 6,379,084	**$ (2,364,396)**	$ 5,069,977	$ 6,379,084	**$ (1,309,106)**
2003						
Hardware	$	$	$	$	$	$

:	4,187,162	5,889,635	(1,702,473)	5,287,788	5,889,635	(601,847)
Software:	$ 228,994	$ 1,127,357	$ (898,363)	$ 289,187	$ 1,127,357	$ (838,170)
Total:	$ 4,416,157	$ 7,016,992	**$ (2,600,835)**	$ 5,576,975	$ 7,016,992	**$ (1,440,017)**

Table E15: Balance of final incremental sales tax revenues and duties losses (continued)

	Sales tax revenues Case 3	Duties loss	Revenues balance Case 3	Sales tax revenues Case 4	Duties loss	Revenues balance Case 4
1999						
Hardware:	$ 3,268,444	$ 4,022,700	$ (754,256)	$ 4,052,870	$ 4,022,700	$ 30,170
Software:	$ 178,750	$ 770,000	$ (591,250)	$ 221,650	$ 770,000	$ (548,350)
Total:	$ 3,447,194	$ 4,792,700	**$ (1,345,506)**	$ 4,274,520	$ 4,792,700	**$ (518,180)**
2000						
Hardware:	$ 3,595,288	$ 4,424,970	$ (829,682)	$ 4,458,157	$ 4,424,970	$ 33,187
Software:	$ 196,625	$ 847,000	$ (650,375)	$ 243,815	$ 847,000	$ (603,185)
Total:	$ 3,791,913	$ 5,271,970	**$ (1,480,057)**	$ 4,701,972	$ 5,271,970	**$ (569,998)**
2001						
Hardware:	$ 3,954,817	$ 4,867,467	$ (912,650)	$ 4,903,973	$ 4,867,467	$ 36,506
Software:	$ 216,288	$ 931,700	$ (715,413)	$ 268,197	$ 931,700	$ (663,504)

Total:	$ 4,171,104	$ 5,799,167	**$ (1,628,063)**	$ 5,172,170	$ 5,799,167	**$ (626,997)**
2002						
Hardware:	$ 4,350,299	$ 5,354,214	$ (1,003,915)	$ 5,394,370	$ 5,354,214	$ 40,157
Software:	$ 237,916	$ 1,024,870	$ (786,954)	$ 295,016	$ 1,024,870	$ (729,854)
Total:	$ 4,588,215	$ 6,379,084	**$ (1,790,869)**	$ 5,689,386	$ 6,379,084	**$ (689,697)**
2003						
Hardware:	$ 4,785,328	$ 5,889,635	$ (1,104,307)	$ 5,933,807	$ 5,889,635	$ 44,172
Software:	$ 261,708	$ 1,127,357	$ (865,649)	$ 324,518	$ 1,127,357	$ (802,839)
Total:	$ 5,047,036	$ 7,016,992	**$ (1,969,956)**	$ 6,258,325	$ 7,016,992	**$ (758,667)**

Table E16: Additional Corporate tax revenues, net of base case

	Number	**Total sales**	**Average sale**	**Average profit**	**Tax revenues**	**Total**	**Average profit**	**Tax revenues**	**Total**
		Case 1		**5%**	**35%**		**10%**	**35%**	
1999	402	$ 101,441,269	252,341.47	$ 12,617	4,416	**$ 650,876**	$ 25,234	8,832	**$ 1,301,753**
2000	422	$ 137,090,159	324,858.20	$ 16,243	5,685	**$ 1,181,897**	$ 32,486	11,370	**$ 2,363,794**
2001	442	$ 197,694,752	447,273.19	$ 22,364	7,827	**$ 2,140,360**	$ 44,727	15,655	**$ 4,280,719**

2002	462	$ 296,974,336	642,801.59	$ 32,140	11,249	**$ 3,765,422**	$ 64,280	22,498	**$ 7,530,845**
2003	482	$ 450,578,829	934,810.85	$ 46,741	16,359	**$ 6,329,938**	$ 93,481	32,718	**$ 12,659,876**

Number	**Total sales**	**Average sale**	**Average profit**	**Tax revenues**	**Total**	**Average profit**	**Tax revenues**	**Total**
	Case 2		**5%**	**35%**		**10%**	**35%**	
1999	402	$ 107,540,150	267,512.81	$ 13,376	4,681	**$ 757,607**	$ 26,751	9,363	**$ 1,515,213**
2000	422	$ 143,798,928	340,755.75	$ 17,038	5,963	**$ 1,299,301**	$ 34,076	11,926	**$ 2,598,601**
2001	442	$ 205,074,398	463,969.23	$ 23,198	8,119	**$ 2,269,503**	$ 46,397	16,239	**$ 4,539,007**
2002	462	$ 305,091,947	660,372.18	$ 33,019	11,557	**$ 3,907,481**	$ 66,037	23,113	**$ 7,814,961**
2003	482	$ 459,508,201	953,336.52	$ 47,667	16,683	**$ 6,486,202**	$ 95,334	33,367	**$ 12,972,404**

Number	**Total sales**	**Average sale**	**Average profit**	**Tax revenues**	**Total**	**Average profit**	**Tax revenues**	**Total**
	Case 3		**5%**	**35%**		**20%**	**35%**	
1999	402	$ 104,755,879	260,586.76	$ 13,029	4,560	**$ 708,882**	$ 26,059	9,121	**$ 1,417,764**
2000	422	$ 140,736,229	333,498.17	$ 16,675	5,836	**$ 1,245,703**	$ 33,350	11,672	**$ 2,491,407**

2001	442	$ 201,705,429	456,347.12	$ 22,817	7,986	**$ 2,210,546**	$ 45,635	15,972	**$ 4,421,093**
2002	462	$ 301,386,081	652,350.82	$ 32,618	11,416	**$ 3,842,628**	$ 65,235	22,832	**$ 7,685,256**
2003	482	$ 455,431,749	944,879.15	$ 47,244	16,535	**$ 6,414,864**	$ 94,488	33,071	**$ 12,829,729**

	Number	Total sales	Average sale	Average profit	Tax revenues	Total	Average profit	Tax revenues	Total
		Case 4		**5%**	**35%**		**20%**	**35%**	
1999	402	$ 111,119,929	276,417.73	$ 13,821	4,837	**$ 820,253**	$ 27,642	9,675	**$ 1,640,506**
2000	422	$ 147,736,684	350,086.93	$ 17,504	6,127	**$ 1,368,211**	$ 35,009	12,253	**$ 2,736,423**
2001	442	$ 209,405,930	473,769.07	$ 23,688	8,291	**$ 2,345,305**	$ 47,377	16,582	**$ 4,690,610**
2002	462	$ 309,856,631	670,685.35	$ 33,534	11,737	**$ 3,990,863**	$ 67,069	23,474	**$ 7,981,725**
2003	482	$ 464,749,354	964,210.28	$ 48,211	16,874	**$ 6,577,922**	$ 96,421	33,747	**$ 13,155,845**

	Number	Total sales	Average sale	Average profit	Tax revenues	Total	Average profit	Tax revenues	Total
		Base Case		**5%**	**35%**		**10%**	**35%**	
1999	350	$ 64,248,340	183,566.69	$ 9,178	3,212	**$ 1,124,346**	$ 18,357	6,425	**$ 2,248,692**
2000	350	$ 69,553,174	198,723.36	$ 9,936	3,478	**$ 1,217,181**	$ 19,872	6,955	**$ 2,434,361**
2001	350	$75,388,492	215,395.69	$ 10,770	3,769	**$ 1,319,299**	$ 21,540	7,539	**$ 2,638,597**
2002	350	$81,807,341	233,735.26	$ 11,687	4,090	**$ 1,431,628**	$ 23,374	8,181	**$ 2,863,257**
2003	350	$88,868,075	253,908.79	$ 12,695	4,443	**$ 1,555,191**	$ 25,391	8,887	**$ 3,110,383**

Table E17: Additional jobs by Professional categories in hardware and software industries, 1999-2003

	%	**1999**	**2000**	**2001**	**2002**	**2003**
IS Manager:	5.24%	0	149	342	579	861
System analyst:	8.96%	0	254	585	991	1474
Programmer:	16.29%	0	463	1063	1802	2680
Computer/Comm. engineer:	33.74%	0	958	2203	3734	5551
Consultants:	0.87%	0	25	57	97	144
Other:	34.90%	0	991	2279	3862	5742
Total:	1	**0**	**2840**	**6529**	**11066**	**16451**

Table E18: Annual wages, with a five percent annual increase, 1999-2003

	1999	2000	2001	2002	2003
IS Manager:	$ 6,000	$ 6,300	$ 6,615	$ 6,946	$ 7,293
System analyst:	$ 9,000	$ 9,450	$ 9,923	$ 10,419	$ 10,940
Programmer:	$ 3,900	$ 4,095	$ 4,300	$ 4,515	$ 4,740
Computer/Comm. engineer:	$ 4,200	$ 4,410	$ 4,631	$ 4,862	$ 5,105
Consultants:	$ 12,000	$ 12,600	$ 13,230	$ 13,892	$ 14,586
Other:	$ 3,000	$ 3,150	$ 3,308	$ 3,473	$ 3,647

Table E19: Income tax revenues, per professional categories, 1999

	1999			
	Annual wage	**Total wage volume**	**Income tax rate**	**Income tax revenues**
IS Manager:	$ 6,000	$ -	5.0%	$ -
System analyst:	$ 9,000	$ -	4.0%	$ -
Programmer:	$ 3,900	$ -	3.0%	$ -
Computer/Comm. engineer:	$ 4,200	$ -	4.0%	$ -
Consultants:	$	$	15.0%	$

	12,000	-		-
Other:	$ 3,000	$ -	4.0%	$ -
				$ -

Table E20: Income tax revenues, per professional categories, 2000 and 2001

	2000			2001		
	Annual wage	**Total wage volume**	**Income tax revenues**	**Annual wage**	**Total wage volume**	**Income tax revenues**
IS Manager:	$ 6,300	$ 936,754	$ 46,838	$ 6,615	2,261,222	$ 113,061
System analyst:	$ 9,450	$ 2,404,335	$ 96,173	$ 9,923	5,803,802	$ 232,152
Programmer:	$ 4,095	$ 1,894,325	$ 56,830	$ 4,300	4,572,693	$ 137,181
Computer/Comm. engineer:	$ 4,410	$ 4,225,801	$ 169,032	$ 4,631	$ 10,200,622	$ 408,025
Consultants:	$ 12,600	$ 312,251	$ 46,838	$ 13,230	753,741	$ 113,061
Other:	$ 3,150	$ 3,122,513	$ 124,901	$ 3,308	$ 7,537,406	$ 301,496
			$ 540,611			**$ 1,304,976**

Table E21: Income tax revenues, per professional categories, 2002 and 2003

	2002			2003		
	Annual wage	**Total wage volume**	**Income tax revenues**	**Annual wage**	**Total wage volume**	**Income tax revenues**
IS Manager:	$ 6,946	4,024,171.18	$ 201,209	$ 7,293	6,281,558.11	$ 314,078
System	$		$	$		$

analyst:	10,419	10,328,706.02	413,148	10,940	16,122,665.82	644,907
Programmer:	$ 4,515	8,137,768.38	$ 244,133	$ 4,740	12,702,706.40	$ 381,081
Computer/Comm. engineer:	$ 4,862	18,153,483.31	$ 726,139	$ 5,105	28,336,806.59	$ 1,133,472
Consultants:	$ 13,892	1,341,390.39	$ 201,209	$ 14,586	2,093,852.70	$ 314,078
Other:	$ 3,473	13,413,903.93	$ 536,556	$ 3,647	20,938,527.04	$ 837,541
			$ 2,322,394			**$ 3,625,157**

Table E22: Tax revenues, case 1

	Balance, Duties & Sales Tax Case 1	**Income tax**	**Corporate tax 5% profits**	a) **Revenues**	**Corporate tax 10% profits**	b) **Revenues**
1999	$ (1,776,405)	$ -	$ 650,876	**$ (1,125,529)**	$ 1,301,753	**$ (474,653)**
2000	$ (1,954,046)	$ 540,611	$ 1,181,897	**$ (231,538)**	$ 2,363,794	**$ 950,360**
2001	$ (2,149,451)	$ 1,304,976	$ 2,140,360	**$ 1,295,885**	$ 4,280,719	**$ 3,436,245**
2002	$ (2,364,396)	$ 2,322,394	$ 3,765,422	**$ 3,723,421**	$ 7,530,845	**$ 7,488,843**
2003	$ (2,600,835)	$ 3,625,157	$ 6,329,938	**$ 7,354,260**	$ 12,659,876	**$ 13,684,198**

Table E23: Tax revenues, case 2

	Balance, Duties & Sales Tax Case 2	**Income tax**	**Corporate tax 5% profits**	a) **Revenues**	**Corporate tax 10% profits**	b) **Revenues**
1999	$ (983,551)	$ -	$ 757,607	**$ (225,944)**	$ 1,515,213	**$ 531,662**
2000	$ (1,081,906)	$ 540,611	$ 1,299,301	**$ 758,006**	$ 2,598,601	**$ 2,057,306**
2001	$ (1,190,097)	$ 1,304,976	$ 2,269,503	**$ 2,384,383**	$ 4,539,007	**$ 4,653,886**
2002	$	$	$	**$**	$	**$**

	(1,309,106)	2,322,394	3,907,481	**4,920,768**	7,814,961	**8,828,249**
2003	$ (1,440,017)	$ 3,625,157	$ 6,486,202	**$ 8,671,342**	$ 12,972,404	**$ 15,157,545**

Table E24: Tax revenues, case 3

Balance, Duties & Sales Tax Case 3	**Income tax**	**Corporate tax 5% profits**	a) **Revenues**	**Corporate tax 10% profits**	b) **Revenues**
$ (1,345,506)	$ -	$ 708,882	**$ (636,624)**	$ 1,417,764	**$ 72,258**
$ (1,480,057)	$ 540,611	$ 1,245,703	**$ 306,258**	$ 2,491,407	**$ 1,551,961**
$ (1,628,063)	$ 1,304,976	$ 2,210,546	**$ 1,887,460**	$ 4,421,093	**$ 4,098,006**
$ (1,790,869)	$ 2,322,394	$ 3,842,628	**$ 4,374,153**	$ 7,685,256	**$ 8,216,781**
$ (1,969,956)	$ 3,625,157	$ 6,414,864	**$ 8,070,066**	$ 12,829,729	**$ 14,484,930**

Table E25: Tax revenues, case 4

Balance, Duties & Sales Tax Case 4	**Income tax**	**Corporate tax 5% profits**	a) **Revenues**	**Corporate tax 10% profits**	b) **Revenues**
$ (1,345,506)	$ -	$ 820,253	**$ (525,253)**	$ 1,640,506	**$ 294,999**
$	$	$	**$**	$	**$**

(1,480,057)	540,611	1,368,211	**428,766**	2,736,423	**1,796,977**
$ (1,628,063)	$ 1,304,976	$ 2,345,305	**$ 2,022,219**	$ 4,690,610	**$ 4,367,524**
$ (1,790,869)	$ 2,322,394	$ 3,990,863	**$ 4,522,388**	$ 7,981,725	**$ 8,513,250**
$ (1,969,956)	$ 3,625,157	$ 6,577,922	**$ 8,233,124**	$ 13,155,845	**$ 14,811,046**